Operating Instructions

VEGAPULS 68

4 … 20 mA/HART - four-wire

Radar

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Supplementary documentation

Information:
Supplementary documents appropriate to the ordered version come with the delivery. You can find them listed in chapter "*Product description*".

Instructions manuals for accessories and replacement parts

Tip:
- 27835 - Indicating and adjustment module PLICSCOM
- 25641 - Interface adapter VEGACONNECT 3
- 32628 - Interface adapter VEGACONNECT 4
- 31088 - Flanges according to DIN-EN-ASME-JIS
- 30176 - Electronics module VEGAPULS series 60
- 31381 - Antenna impedance cone VEGAPULS 62 and 68

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1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used

Information, tip, note
This symbol indicates helpful additional information.

Caution: If this warning is ignored, faults or malfunctions can result.
Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.
Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.

Ex applications
This symbol indicates special instructions for Ex applications.

• **List**
The dot set in front indicates a list with no implied sequence.

→ **Action**
This arrow indicates a single action.

1 **Sequence**
Numbers set in front indicate successive steps in a procedure.

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2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protection equipment must always be worn.

2.2 Appropriate use

VEGAPULS 68 is a sensor for continuous level measurement.

You can find detailed information on the application range in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards as well as all prevailing safety regulations and accident prevention rules.

Depending on the model, the emitting frequencies of all radar sensors are either in the C or K band range. The low transmitting power lies far below the internationally permitted limit values. When the instrument used correctly, it presents no danger to human health. It may be operated without restriction outside of closed metallic vessels.

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The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the required occupational safety measures with the current valid rules and regulations and also take note of new regulations.

2.5 Safety approval markings and safety tips

The safety approval markings and safety tips on the device must be observed.

2.6 CE conformity

VEGAPULS 68 is in CE conformity with EMC (89/336/EWG) and LVD (73/23/EWG).

Conformity has been judged according to the following standards:

- EMC:
  - Emission EN 61326: 1997 (class B)
  - Susceptibility EN 61326: 1997/A1:1998
- R & TTE directive: I-ETS 300-440 Expert Opinion No. 05-111723, Notified Body No. 0700
- LVD: EN 61010-1: 2001

2.7 Fulfilling of NAMUR recommendations

With respect to interference resistance and emitted interference, the NAMUR recommendation NE 21 is fulfilled.

With respect to compatibility, the NAMUR recommendation NE 53 is fulfilled. This applies also to the corresponding indicating and adjustment components. VEGA instruments are generally upward and downward compatible.

- Sensor software for DTM VEGAPULS 68 HART, PA or FF
- DTM VEGAPULS 68 for adjustment software PACTware
- Indicating and adjustment module for sensor software

The parameter adjustment of the basic sensor functions is independent of the software version. The range of available functions depends on the respective software version of the individual components.

The software version of VEGAPULS 68 can be determined as follows:

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- via PACTware
- on the type label of the electronics
- via the indicating and adjustment module

You can view all software histories on our website www.vega.com. Make use of this advantage and get registered for update information via e-mail.

2.8 FCC and IC conformity (only for USA/Canada)

VEGAPULS sensors with all antenna versions are FCC and IC approved:

- FCC ID: O6QPULS68
- IC: 3892A-PS68

Modifications not expressly approved by VEGA will lead to expiry of the operating licence according to FCC.

VEGAPULS 68 is in conformity with part 15 of the FCC regulations. Take note of the respective operating regulations:

- The instrument must not cause any interfering emissions
- This device must accept any interference received, including interference that may cause undesired operation.

2.9 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

2.10 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfil this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

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3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGAPULS 68 radar sensor
- Documentation
  - this operating instructions manual
  - Safety Manual 31338 "*VEGAPULS series 60 - 4 … 20 mA/HART*"
  - Operating instructions manual - 27835 "*Indicating and adjustment module PLICSCOM*" (optional)
  - Ex-specific "*Safety instructions*" (with Ex-versions)
  - if necessary, further certificates

Components

VEGAPULS 68 consists of the following components:

- Horn or parabolic antenna
- process fitting (depending on the version flange or thread)
- Each optionally available with swivelling holder (only with flange), rinsing air connection, reflux valve
- Housing with electronics
- Housing cover, optionally available with indicating and adjustment module PLICSCOM

The components are available in different versions.

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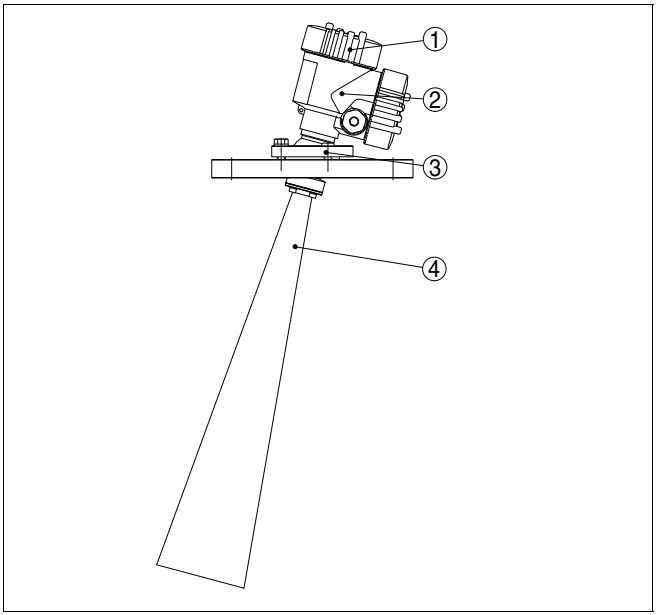

Fig. 1: VEGAPULS 68 with horn antenna and swivelling holder
1 Housing cover with integrated PLICSCOM (optional)
2 Housing with electronics
3 Swivelling holder with flange
4 Horn antenna

3.2 Principle of operation

Area of application

VEGAPULS 68 is a radar sensor in K-band technology for continuous level measurement in solids.

A version of VEGAPULS 68 is available for each area of application:

- The version with horn antenna is particularly suitable for measurement of virtually all bulk solids in small silos and vessels.
- The version with parabolic antenna is particularly suitable for large silos and vessels with up to 70 m (76 yd) measuring distance and for measurement of solids with low dielectric constant.

VEGAPULS 68 is also suitable for applications in liquids.

Functional principle

The antenna of the radar sensor emits short radar pulses with a duration of approx. 1 ns. These pulses are reflected by the product and received by the antenna as echoes. The running time of the radar pulses from emission to reception is

proportional to the distance and hence to the level. The determined level is converted into an appropriate output signal and outputted as measured value.

Voltage supply

Four-wire electronics with separate power supply.

The supply voltage range can differ depending on the instrument version.

Data for power supply is specified in chapter "*Technical data*".

Measured value transmission is carried out via the 4 … 20 mA/HART output separate from power supply.

The backlight of the indicating and adjustment module is powered by the sensor. The prerequisite for this is a supply voltage at a certain level. The exact voltage specifications are stated in chapter "*Technical data*".

3.3 Operation

VEGAPULS 68 can be adjusted with different adjustment media:

- with indicating and adjustment module
- with the suitable VEGA DTM in conjunction with an adjustment software according to the FDT/DTM standard, e.g. PACTware and PC
- with manufacturer-specific adjustment programs AMS™ or PDM
- With a HART handheld

The entered parameters are generally saved in VEGAPULS 68, optionally also in the indicating and adjustment module or in PACTware.

3.4 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test according to DIN EN 24180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Transport

Transport must be carried out under consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 … 85 %

4 Mounting

4.1 General instructions

Mounting position

Select an installation position you can easily reach for mounting and connecting as well as later retrofitting of an indicating and adjustment module. The housing can be rotated by 330° without the use of any tools. You can also install the indicating and adjustment module in four different positions (each displaced by 90°).

Screwing in

Warning:
With threaded versions, the housing must not be used to screw in the instrument! Applying tightening forces on the housing can damage its internal parts.

Moisture

Use the recommended cables (see chapter "*Connecting to power supply*") and tighten the cable gland.

You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e. g. through cleaning processes) or on cooled or heated vessels.

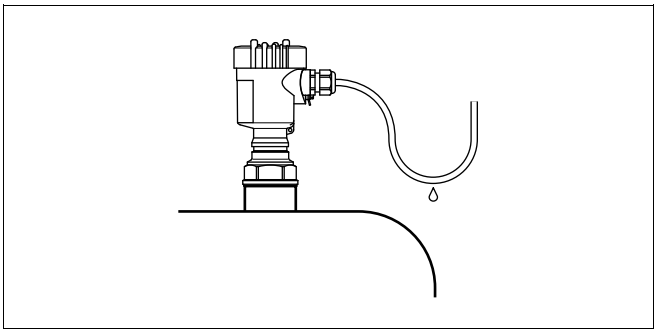

Fig. 2: Measures against moisture penetration

Measuring range

The reference plane for the measuring range of the sensors is the lower edge of the flange or the seal surface of the thread.

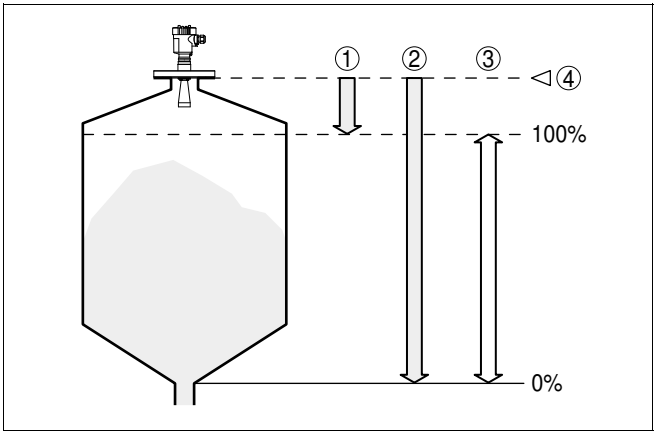

Fig. 3: Measuring range (operating range), max. measuring distance and reference plane
1 full
2 empty (max. measuring distance)
3 Measuring range
4 Reference plane

Information:
If the medium reaches the antenna, buildup can form on it and cause faulty measurements later on.

Suitability for process conditions

Make sure that all parts of the instrument in contact with the measured product, especially the sensor element, process seal and process fitting, are suitable for the existing process conditions such as process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "*Technical data*" in the or on the type label.

4.2 Mounting preparations - Horn antenna

Information:
This information applies only to special versions!

VEGAPULS 68 is also available in versions where the antenna has a bigger diameter than the process fitting (thread, flange). The antenna must therefore be disconnected from the process fitting before mounting. Proceed as follows:

1 Loosen the hexagon screws (3) on the antenna socket with an Allan key (size 3)

2 Remove the antenna (4)

Note:
The plastic conemust not be pulled out of the antenna socket.

3 Insert the antenna from below into the vessel socket and secure it against falling off

4 Retighten the antenna with hexagon screws to the antenna socket; torque max. 10 Nm (7.5 lbf ft)

Note:
VEGAPULS 68 with rinsing air connection or antenna extension is provided with a notch on the antenna socket. This notch must correspond to the marking on the hexagon of the process fitting (the marking specifies the position of the polarisation level of the radar signal).

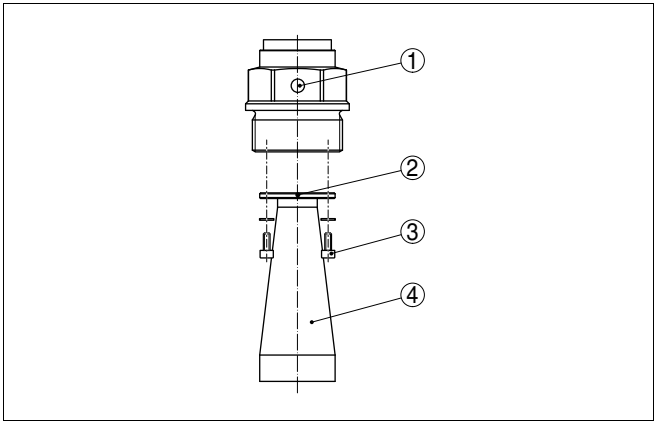

Fig. 4: Dismounting horn antenna
1 Marking
2 Notch
3 Hexagon screws on the antenna socket
4 Antenna

4.3 Mounting preparations - Parabolic antenna

Information:
This information applies only to special versions!

VEGAPULS 68 is also available in versions where the antenna has a diameter larger than the process fitting (thread, flange). With such versions the antenna must be disconnected from the process fitting before mounting. Proceed as follows:

1 Clamp VEGAPULS 68 with the flange, e.g. in a bench vice
2 Hold the connection piece (3) with a wrench SW 22 on the flattenings
3 Unscrew the locknut (2) with SW 36 against the antenna
4 Loosen compression nut (1) with a screwdriver SW 41 completely in the direction of the antenna
5 Remove the parabolic antenna (4) axially
6 Mount sensor flange to the adapter flange and clamp it
7 Check, if the O-ring seal is available on the adapter and if it is not damaged.

Note:
A damaged O-ring seal must be replaced: FKM (Viton) article no. 2.28248, FFKM (Kalrez 6375) article no. 2.27351

8 Remount the parabolic antenna (4)
9 Tighten compression nut (3) with SW 41, torque max. 50 Nm
10 Tighten locknut (2) with SW 36, torque max. 40 Nm.

Note:
Take note for VEGAPULS 68 with rinsing air connection that the holes in the antenna and in the process fitting correspond. This ensures a sufficient air flow (the air is led through the holes to the feed system. A rinsing of the parabolic antenna in total is not intended).

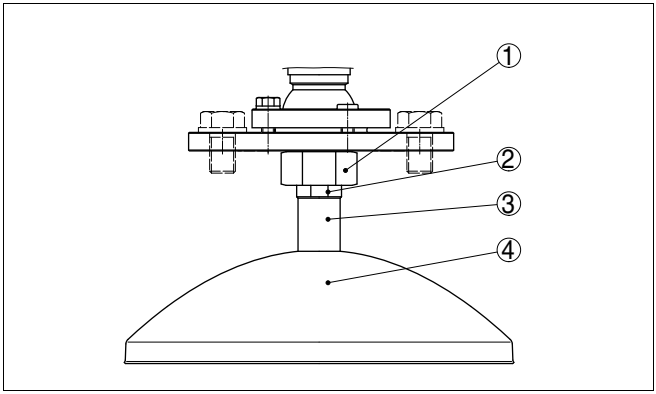

Fig. 5: Dismounting, parabolic antenna
1 Compression nut
2 Locknut
3 Connection piece
4 Parabolic antenna

4.4 Mounting instructions

Horn and parabolic antenna

The illustrations with the following mounting instructions show a VEGAPULS 68 with horn antenna. The mounting instructions apply analogously also to the version with parabolic antenna.

Mounting position

Mount the sensor at least 200 mm (7.874 in) away from the vessel wall.

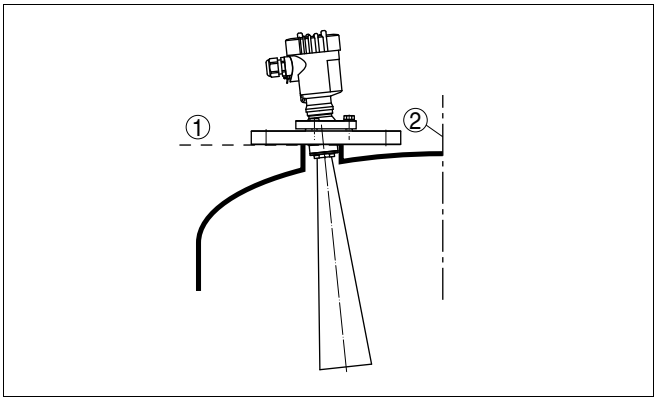

Fig. 6: Mounting position
1 Reference plane

If you cannot keep this distance you should carry out a false echo storage before setup. This applies mainly if buildup on the vessel wall is expected. In this case, we recommend repeating a false echo storage later with existing buildup.

Orientation

To measure as much of the vessel volume as possible, the sensor should be aligned so that the measuring beam reaches the lowest level in the vessel. In a cylindrical silo with conical outlet, the easiest way is to mount the instrument in the center of the silo.

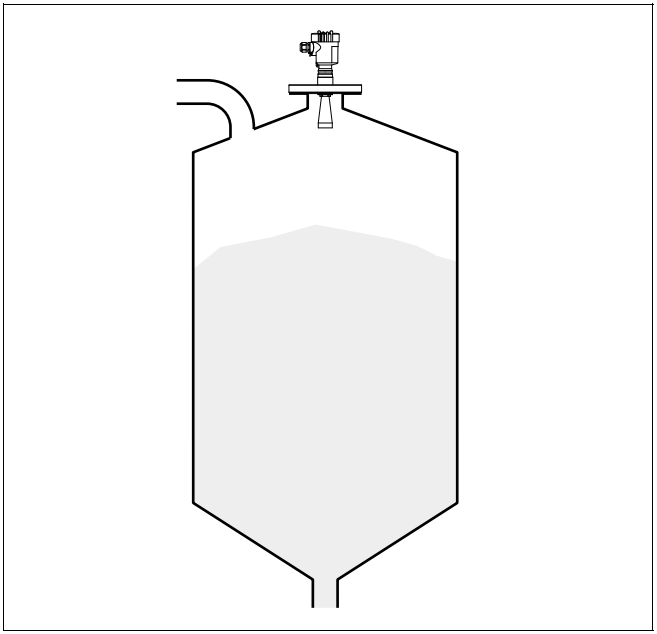

Fig. 7: Orientation

If mounting in the center of the silo is not possible, the sensor can be directed to the vessel center by means of an optional swivelling holder. The following description gives an overview on the determination of the necessary angle of inclination.

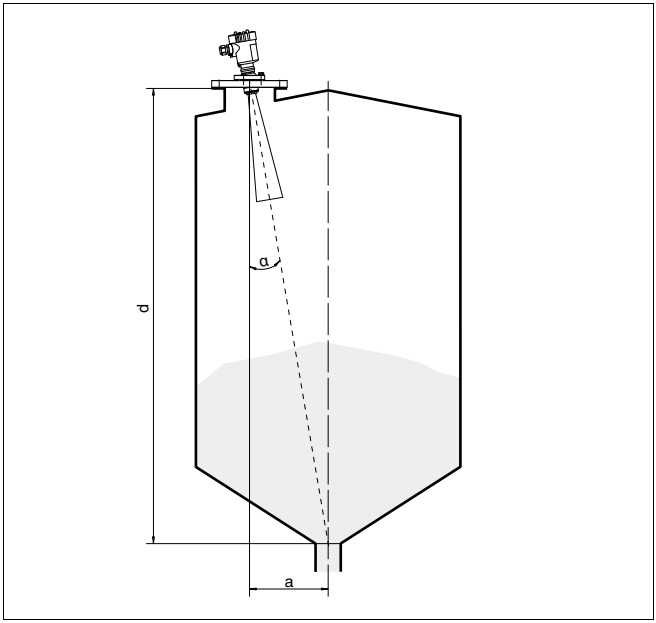

Fig. 8: Proposal for installation after orientation VEGAPULS 68

The angle of inclination depends on the vessel dimensions. It can be checked easily on the sensor with a suitable level or air-lever. The following chart states the distance "a" between installation position and vessel center depending on the measuring distance for an angle of inclination of 2° … 10°.

Distance d (m)	**2°**	**4°**	**6°**	**8°**	**10°**
2	0.1	0.1	0.2	0.3	0.4
4	0.1	0.3	0.4	0.6	0.7
6	0.2	0.4	0.6	0.8	1.1
8	0.3	0.6	0.8	1.1	1.4
10	0.3	0.7	1.1	1.4	1.8
15	0.5	1.0	1.6	2.1	2.6
20	0.7	1.4	2.1	2.8	3.5
25	0.9	1.7	2.6	3.5	4.4
30	1.0	2.1	3.2	4.2	5.3
35	1.2	2.4	3.7	4.9	6.2
40	1.4	2.8	4.2	5.6	7.1
45	1.6	3.1	4.7	6.3	7.9
50	1.7	3.5	5.3	7	8.8

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Distance d (m)	2°	4°	6°	8°	10°
55	1.9	3.8	5.8	7.7	9.7
60	2.1	4.2	6.3	8.4	10.6
65	2.3	4.5	6.8	9.1	11.5
70	2.4	4.9	7.4	9.8	12.3

Example:

In a vessel with 20 m height, the installation position of the sensor is 1.4 m from the vessel center.

The necessary angle of inclination of 4° can be read out from this chart.

Proceed as follows to adjust the angle of inclination with the swivelling holder:

1 Loosen terminal screw of the swivelling holder with a fork spanner SW 13

2 Direct the sensor, check angle of inclination

Information:
The max. angle of inclination of the swivelling holder is approx. 15°

3 Tighten the terminal screw, torque max. 20 Nm.

Information:
The hexagon screws must not be loosened.

Inflowing medium

Mounting should not be too close to the inflowing material as the microwave signal will be interferred. The optimum mounting position is on the opposite of the filling. To avoid strong pollution, the distance to the filter or dust extraction must be as big as possible.

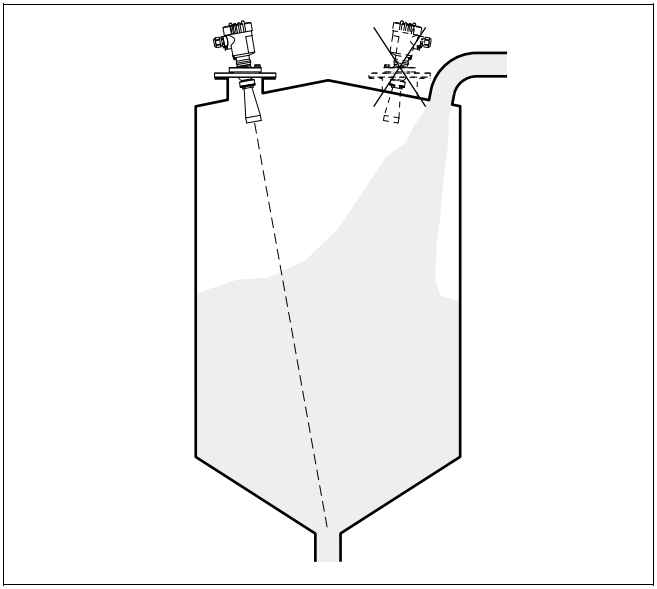


Fig. 9: Inflowing medium

Socket

Socket pieces should be dimensioned such that the antenna end protrudes at least 10 mm (0.4 in) out of the socket.

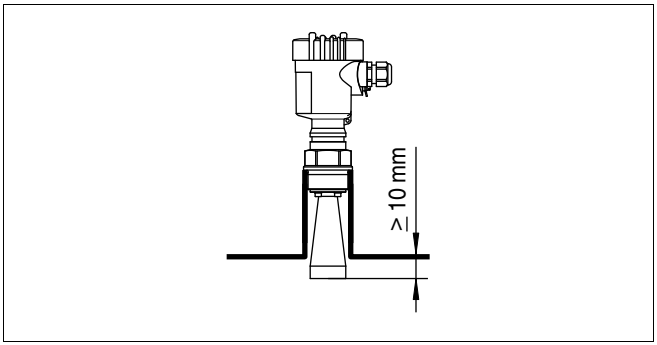
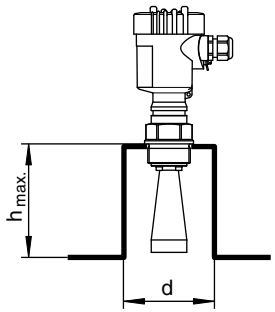


Fig. 10: Recommended socket mounting

If the reflective properties of the medium are good, you can mount VEGAPULS 68 on sockets which are higher than the length of the antenna. You will find recommended values for socket heights in the following illustration. The socket end should be smooth and burr-free, if possible also rounded. After installation you must carry out a false echo storage.



d	h max.
1½"	200 mm
50 mm/2"	250 mm
80 mm/3"	300 mm
100 mm/4"	500 mm
150 mm/6"	800 mm

Fig. 11: Deviating socket dimensions

Tip:
VEGAPULS 68 is optionally also available with antenna extension. Hence the antenna length can be selected such that the antenna end protrudes 10 mm (0.4 in) out of the socket.

Mounting in multiple channel silo

The silo walls of multiple chamber silos are often made of profile walls, such as e.g. profile sheeting, to ensure the required stability. If the radar sensor is mounted very close to a heavily structured vessel wall, considerable false reflections can be generated. Hence the sensor should be mounted at a large distance from the separating wall. The optimal mounting position is on the outer wall of the silo with the sensor directed towards the emptying aperture in the silo center.

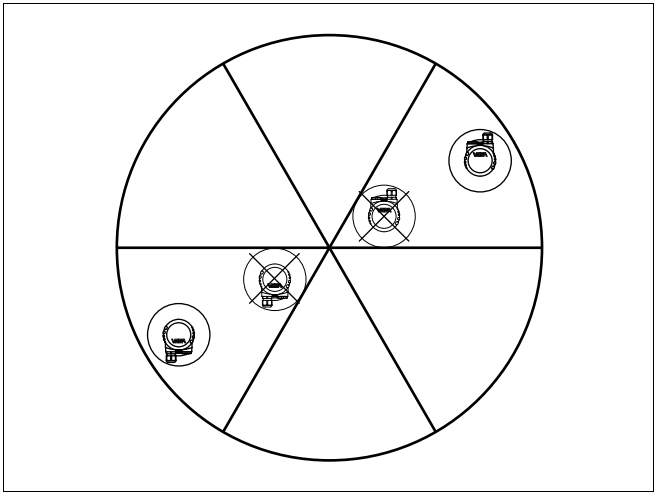


Fig. 12: Installation of VEGAPULS 68 in multiple chamber silos

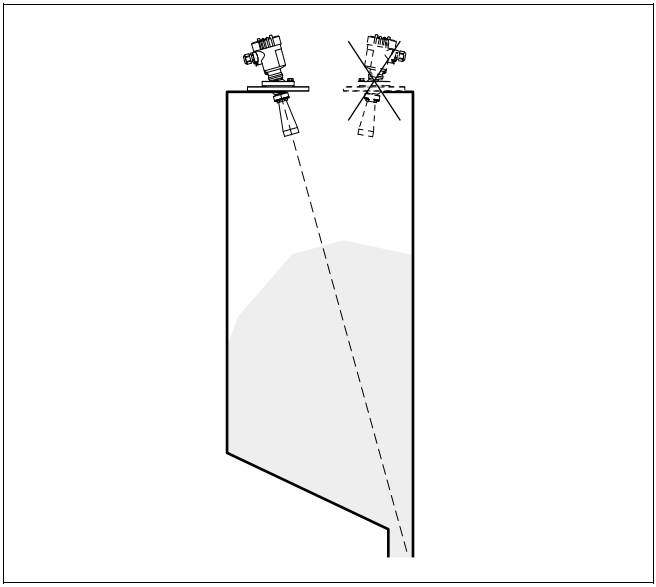


Fig. 13: Orientation of VEGAPULS 68 for emptying in the silo center

Vessel installations

Silo installations such as e.g. ladders, level switches, struts, and also structured vessel walls, can cause false echoes that get superimposed on the useful echo. The mounting location

of the radar sensor should be a place where no installations cross the microwave signals. Make sure when planning your measurement loop that the radar signals have a "clear view" to the product.

In case of existing vessel installations, a false echo storage should be carried out during setup.

If large vessel installations such as struts or supports cause false echoes, these can be attenuated through supplementary measures. Small, inclined sheet metal baffles above the installations scatter the radar signals and prevent direct interfering reflections.

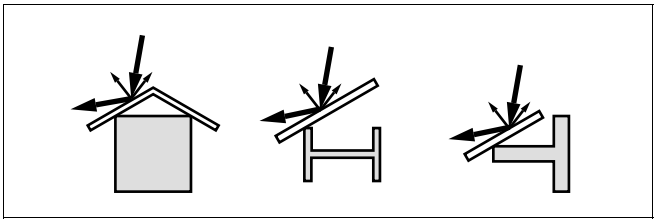


Fig. 14: Cover smooth profiles with deflectors

Air purging

To avoid strong buildup and dust in the antenna system, the sensor should not be mounted directly at the dust extraction of the vessel.

Tip:
In case of extreme dust in the antenna system, VEGAPULS 68 is available with purging connection e.g. for air. The air is distributed via channels in the antenna system and keeps is virtually clean from dust.

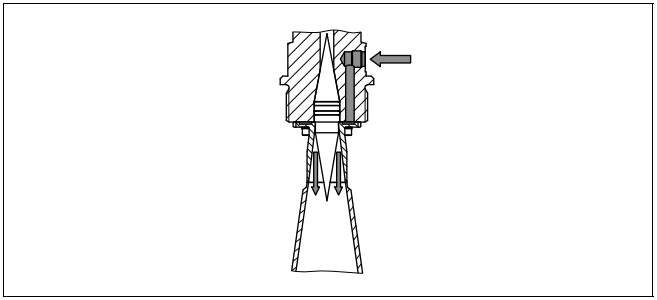


Fig. 15: Purging air connection with horn antenna

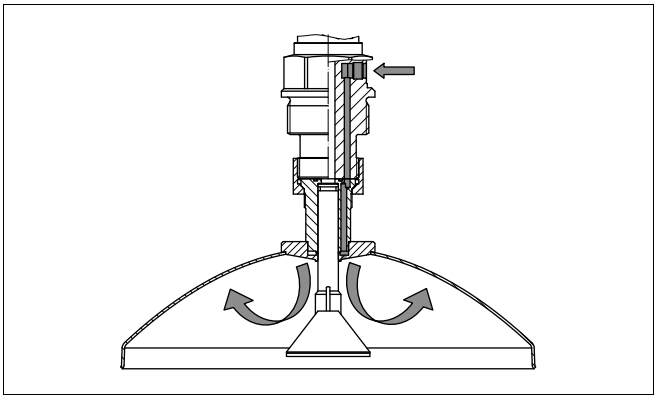


Fig. 16: Purging air connection with parabolic antenna

In practice it was shown that a pressure of approx. 0.2 … 1 bar is enough to provide a sufficient air flow (see diaphragm in chapter "*Technical data*").

Material heaps

Large material heaps are detected with several sensors, which can be mounted on e.g. traverse cranes. For this type of application, it is best to orient the sensor toward the solid surface. A mutual infuence of the sensor is not possible.

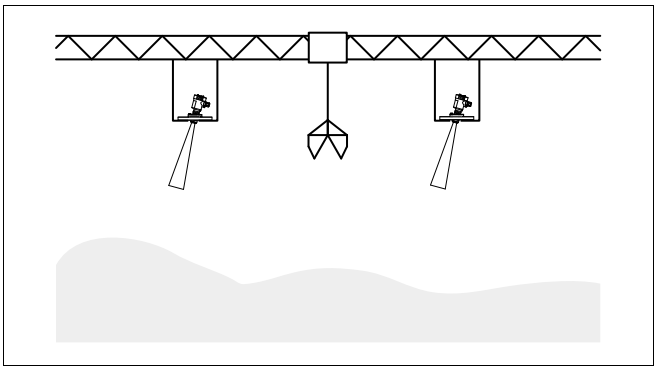


Fig. 17: Radar sensors on traverse crane

Information:
Keep in mind that for these applications, the sensors are designed for relatively slow level changes. When using VEGAPULS 68 on a movable bracket, the max. measuring rate must be observed (see chapter "*Technical data*").

5 Connecting to power supply

5.1 Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage
- If overvoltage surges are expected, overvoltage arresters should be installed.

Tip:
We recommend using VEGA overvoltage arresters B63-48 and ÜSB 62-36G.X.

Take note of safety instructions for Ex applications

In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units.

Select power supply

Supply voltage and current output are carried on separate two-wire connection cables if reliable separation is required. The supply voltage range can differ depending on the instrument version.

Data for power supply is specified in chapter "*Technical data*".

The standard version can be operated with an earth-connected current output, the Exd version must be operated with a floating output.

This instrument is designed in protection class I. To maintain this protection class, it is absolutely necessary that the ground conductor be connected to the internal ground terminal. Take note of the general installation regulations.

As a rule, connect the instrument to vessel ground (potential euqalisation) or in case of plastic vessels to the next ground potential. For this purpose there is a ground terminal on the side of the instrument housing.

Selecting connection cable

For power supply, an approved installation cable with PE conductor is necessary.

The 4 … 20 mA current output is connected with standard two-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use cable with round cross-section. A cable outer diameter of 5 … 9 mm (0.2 … 0.35 in) ensures the seal effect of the cable gland. If you are using cable with other diameter or cross-section, you have to exchange the seal or use a suitable cable gland.

Cable screening and grounding

If screened cable is necessary, connect the cable screen on both ends to ground potential. In the sensor, the screen must be connected directly to the internal ground terminal. The ground terminal on the outside of the housing must be connected to the potential equalisation (low impedance).

If potential equalisation currents are expected, the connection on the processing side must be made via a ceramic capacitor (e. g. 1 nF, 1500 V). The low frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.

Installation with Ex applications

Take note of the corresponding installation regulations for Ex applications. In particular, make sure that no potential equalisation currents flow over the cable screen. In case of grounding on both sides this can be achieved by the use of a capacitor or a separate potential equalisation.

With the Exd version, the minus side of the signal output is galvanically connected to ground via protective diodes. When connecting the instrument to a grounded PLC, equalising currents can flow in case of potential differences which can cause malfunctions. Make sure that there is sufficient potential equalisation from the system side or realise the connection via switching amplifier.

5.2 Connection procedure

Proceed as follows:

1 Unscrew the housing cover

2 If an indicating and adjustment module is installed, remove it by turning it slightly to the left.

3 Loosen compression nut of the cable entry

4 Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) insulation from the ends of the individual wires

5 Insert the cable through the cable gland into the sensor

6 Lift the opening levers of the terminals with a screwdriver (see following illustration)

7 Insert the wire ends into the open terminals according to the wiring plan

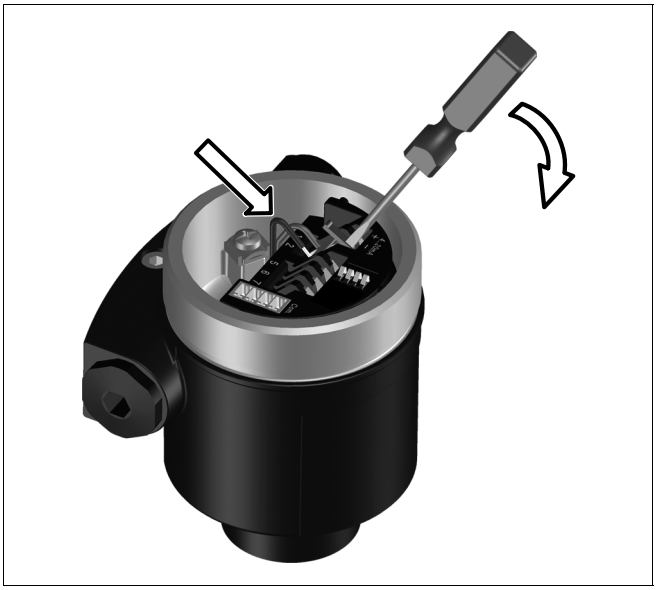


Fig. 18: Connection steps 6 and 7

8 Press down the opening levers of the terminals, you will hear the terminal spring closing

9 Check the hold of the wires in the terminals by lightly pulling on them

10 Connect the screen to the internal ground terminal, connect the outer ground terminal with potential equalisation

11 Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable

12 Screw the housing cover on

The electrical connection is finished.

5.3 Wiring plan, double chamber housing

The following illustrations apply to the non-Ex as well as to the Ex-d version.

Housing overview

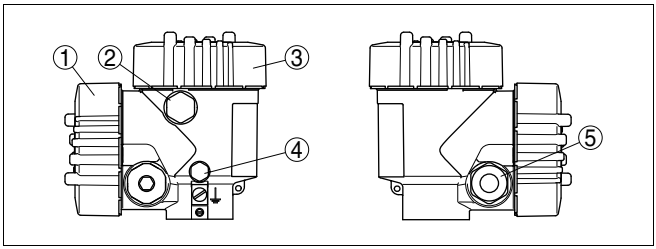


Fig. 19: Double chamber housing
1 Housing cover, connection compartment
2 Blind stopper or plug M12 x 1 for VEGADIS 61 (optional)
3 Housing cover, electronics compartment
4 Filter element for air pressure compensation
5 Cable gland

Electronics compartment

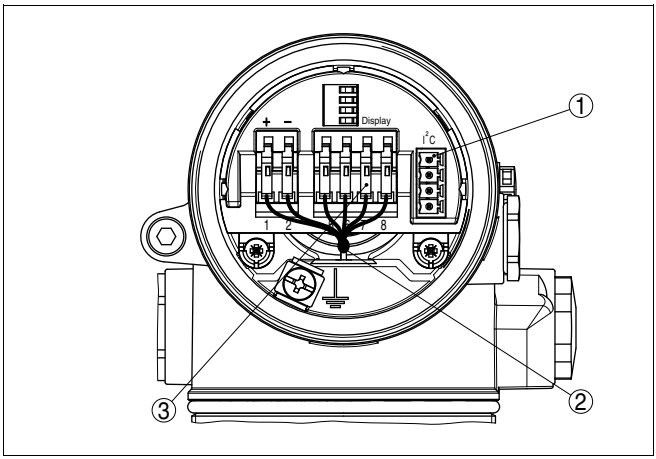


Fig. 20: Electronics compartment, double chamber housing
1 Plug connector for VEGACONNECT (I^2C interface)
2 Internal connection cable to the connection compartment
3 Terminals for VEGADIS 61

Connection compartment

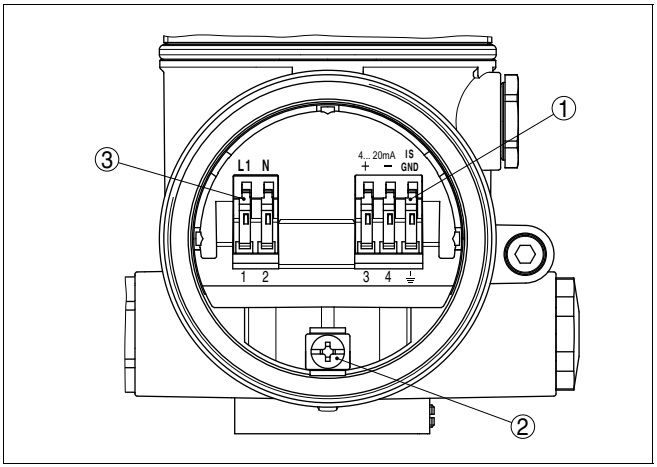


Fig. 21: Connection compartment, double chamber housing
1 Spring-loaded terminals for signal output
2 Ground terminal for connection of the ground conductor and screen
3 Spring-loaded terminals for voltage supply

Information:
Keep in mind that the indicating and adjustment module must only be used in the electronics compartment.

Wiring plan

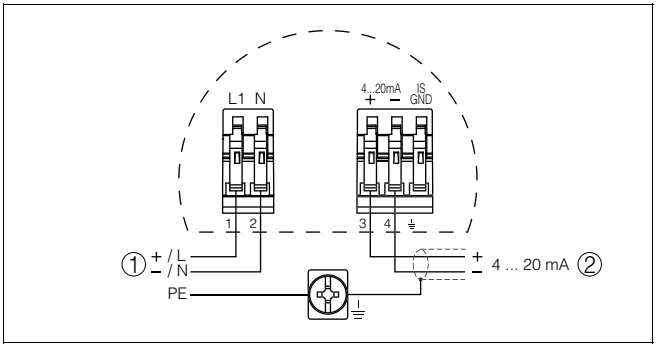


Fig. 22: Wiring plan, double chamber housing
1 Voltage supply
2 Signal output

5.4 Switch on phase

Switch on phase

After connecting VEGAPULS 68 to power supply or after a voltage recurrence, the instrument carries out a self-check for approx. 30 seconds:

- Internal check of the electronics
- Indication of the instrument type, the firmware as well as the sensor TAGs (sensor designation)
- Output signal jumps briefly (approx. 10 seconds) to the set fault current

Then the corresponding current is outputted to the cable (the value corresponds to the actual level as well as the settings already carried out, e.g. factory setting).

6 Set up with the indicating and adjustment module PLICSCOM

6.1 Short description

Function/Configuration

The indicating and adjustment module is used for measured value display, adjustment and diagnosis. It can be mounted in the following housing versions and instruments:

- All sensors of the plics® instrument family, in the single as well as in the double chamber housing (optionally in the electronics or connection compartment)
- External indicating and adjustment unit VEGADIS 61

From a hardware version …- 01 or higher of the indicating and adjustment module as well as of the corresponding sensor, an integrated backlight can be switched on via the adjustment menu. The hardware version is stated on the type label of the indicating and adjustment module or the sensor electronics.

Note:
You can find detailed information on the adjustment in the operating instructions manual "*Indicating and adjustment module*".

6.2 Insert indicating and adjustment module

Mount/Dismount indicating and adjustment module

The indicating and adjustment module can be inserted into the sensor and removed again at any time. It is not necessary to interrupt the power supply.

Proceed as follows:

1 Unscrew the housing cover

2 Place the indicating and adjustment module in the desired position on the electronics (you can choose any one of four different positions - each displaced by 90°)

3 Press the indicating and adjustment module onto the electronics and turn it to the right until it snaps in.

4 Screw housing cover with inspection window tightly back on

Removal is carried out in reverse order.

The indicating and adjustment module is powered by the sensor, an additional connection is not necessary.

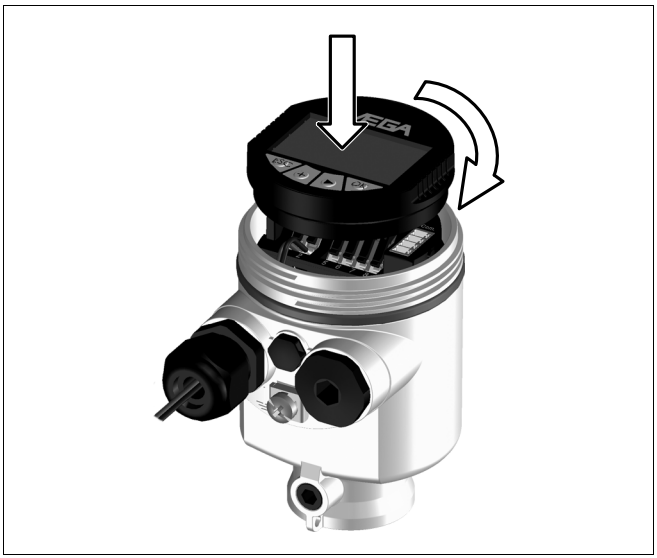


Fig. 23: Installation of the indicating and adjustment module

Note:
If you intend to retrofit the instrument with an indicating and adjustment module for continuous measured value indication, a higher cover with an inspection glass is required.

6.3 Adjustment system

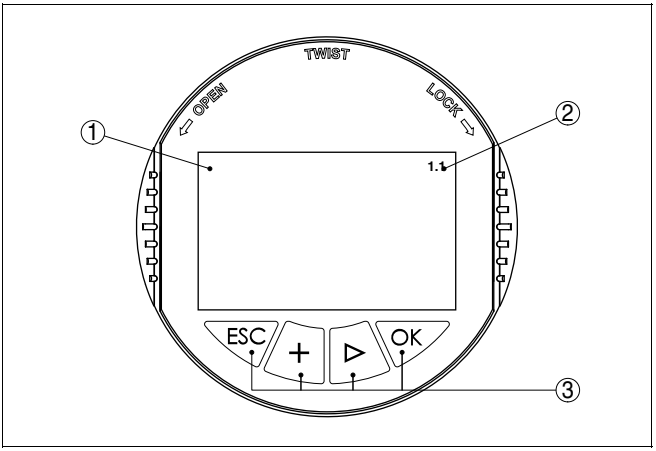


Fig. 24: Indicating and adjustment elements
1 LC display
2 Indication of the menu item number
3 Adjustment keys

Key functions

- ***[OK]*** key:
  - Move to the menu overview
  - Confirm selected menu
  - Edit parameter
  - Save value
- ***[->]*** key to select:
  - menu change
  - list entry
  - Select editing position
- ***[+]*** key:
  - Change value of the parameter
- ***[ESC]*** key:
  - interrupt input
  - jump to the next higher menu

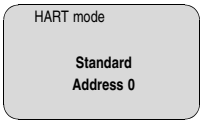
Adjustment system

The sensor is adjusted via the four keys of the indicating and adjustment module. The LC display indicates the individual menu items. The functions of the individual keys are shown in the above illustration. Approx. 10 minutes after the last pressing of a key, an automatic reset to measured value indication is triggered. Any values not confirmed with ***[OK]*** will not be saved.

6.4 Setup procedure

Address setting HART-Multidrop

In HART-Multidrop mode (several sensors on one input) the address must be set before continuing with the parameter adjustment. You will find a detailed description in the operating instructions manual "*Indicating and adjustment module*" or in the online help of PACTware or DTM.



Parameter adjustment

As VEGAPULS 68 is a distance measuring instrument, the distance from the sensor to the product surface is measured. To have the real product level displayed, an allocation of the measured distance to the percentage height must be made. To carry out this adjustment, the distance is entered with full and empty vessel. If these values are not known, an adjustment with the distance values, e.g. 10 % and 90 % is also possible. Starting point for these distance specifications is always the seal surface of the thread or flange. With these settings, the real level is calculated. Furthermore the operating range of the sensor is limited from maximum to the required range.

The real product level during this adjustment is not important, because the min./max. adjustment is always carried out without changing the product level. These settings can be made ahead of time without the instrument having to be installed.

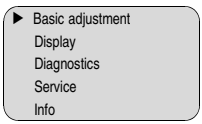
In the main menu item "*Basic adjustment*", the individual submenu items should be selected one after the other and provided with the correct parameter values.

Start your parameter adjustment with the following menu items of the basic adjustment:

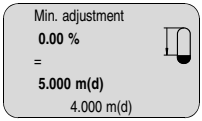
Carrying out min. adjustment

Proceed as follows:

1 Move from the measured value display to the main menu by pushing ***[OK]***.



2 Select the menu item "*Basic adjustment*" with ***[->]*** and confirm with ***[OK]***. Now the menu item "*Min. adjustment*" is displayed.



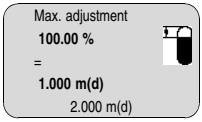
3 Prepare the % value for editing with ***[OK]*** and set the cursor to the requested position with ***[->]***. Set the requested percentage value with ***[+]*** and save with ***[OK]***. The cursor jumps now to the distance value.

4 Enter the suitable distance value in m for the empty vessel (e.g. distance from the sensor to the vessel bottom) corresponding to the percentage value.

5 Save the settings with ***[OK]*** and move to "Max. adjustment" with ***[->]***.

Carrying out max. adjustment

Proceed as follows:



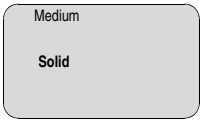
1 Prepare the % value for editing with ***[OK]*** and set the cursor to the requested position with ***[->]***. Set the requested percentage value with ***[+]*** and save with ***[OK]***. The cursor jumps now to the distance value.

2 Enter the appropriate distance value in m (corresponding to the percentage value) for the full vessel. Keep in mind that the max. level must lie below the dead band.

3 Save the settings with ***[OK]*** and move to "Medium selection" with ***[->]***.

Medium selection

Each product has different reflective properties. In solids, these are dust generation, material cones and additional echoes caused by the vessel wall. Due to the medium selection, the sensor is adapted in an optimum way to the product and the accuracy, particularly for products with bad reflective properties, is increased considerably.



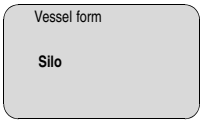
With solids, you can also choose between "*Powder/Dust*", "*Granular/Pellets*" or "*Ballast/Pebbels*".

In liquids, fluctuating surfaces and foam generation are further interfering factors. To adapt the sensor to the different conditions, a general selection is made in this menu item, i.e. "*Solid*" or "*Liquid*".

Enter the requested parameter via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Vessel form

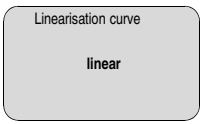
Apart from the medium, the vessel shape can also influence the measurement. To adapt the sensor to these measuring conditions, this menu item offers different options depending on whether liquid or solid is selected. With "*Solid*" these are "*Silo*" or "*Bunker*", with "*Liquid*", "*Storage tank*", "*Stilling tube*", "*Open vessel*" or "*Stirred vessel*".



Enter the requested parameter via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Linearisation curve

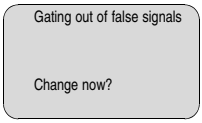
A linearization is necessary for all vessels in which the vessel volume does not increase linearly with the level - e. g. with a cylindrical or spherical tank - and the indication or output of the volume is required. Corresponding linearization curves are preprogrammed for these vessels. They represent the correlation between the level percentage and vessel volume. By activating the appropriate curve, the volume percentage of the vessel is displayed correctly. If the volume should not be displayed in percent but e.g. in l or kg, a scaling can be also set in the menu item "*Display*".



Enter the requested parameter via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Gating out of false signals

High sockets or vessel installations, such as e. g. struts or agitators as well as buildup and weld joints on the vessel walls cause interfering reflections which can impair the measurement. A false echo storage detects and marks these false echoes, so that they are no longer taken into account for the level measurement. A false echo memory should be created with empty vessel so that all potential interfering reflections will be detected.



Proceed as follows:

1 Move from the measured value display to the main menu by pushing ***[OK]***.

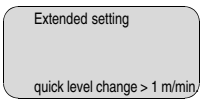
2 Select the menu item "*Service*" with ***[->]*** and confirm with ***[OK]***. Now the menu item "*False signal suppression*" is displayed.

3 Confirm "*False signal suppression - Change now*" with ***[OK]*** and select in the below menu "*Create new*". Enter the actual distance from the sensor to the product surface. All false signals in this area are detected by the sensor and saved after confirming with ***[OK]***.

Note:
Check the distance to the product surface, because if an incorrect (too large) value is entered, the existing level will be saved as false signal. The filling level would then no longer be detectable in this area.

Extended setting/Quick level change

The menu item "*Extended setting*" offers the possibility to optimise VEGAPULS 68 for applications in which the level changes very quickly. For this reason, select the function "*Quick level change > 1 m/min.*".



Note:
Since with the function "*Quick level change > 1 m/min.*" the generation of an average value of the signal processing is considerably reduced, false reflections by agitators or vessel installations can cause measured value fluctuations. A false echo memory is thus recommended.

Copy sensor data

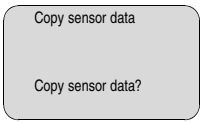
This function enables reading out parameter adjustment data as well as writing parameter adjustment data into the sensor via the indicating and adjustment module. A description of the function is available in the operating instructions manual "*Indicating and adjustment module*".

The following data are read out or written with this function:

- Measured value presentation
- Adjustment
- Medium
- Inner diameter of the standpipe (with standpipe versions)
- Vessel form
- Damping
- Linearisation curve
- Sensor-TAG
- Displayed value
- Display unit
- Scaling
- Current output
- Unit of measurement
- Language

The following safety-relevant data are **not** read out or written:

- HART mode
- PIN
- SIL



Reset

Basic adjustment
If the "*Reset*" is carried out, the sensor resets the values of the following functions to the reset values (see chart):[1)]

[1)] Sensor-specific basic adjustment.

Function	Reset value
Max. adjustment	0 m(d)
Min. adjustment	15 m(d) (VEGAPULS 67) 70 m(d) (VEGAPULS 68)
Medium	Solid
Vessel form	not known
Damping	0 s
Linearisation	linear
Sensor-TAG	Sensor
Displayed value	Distance
Extended settings	None
Current output - characteristics	4 … 20 mA
Current output - max. current	20 mA
Current output - min. current	4 mA
Current output - failure	< 3.6 mA
Unit of measurement	m(d)

The values of the following functions are *not* reset to the reset values (see chart) with "**Reset**":

Function	Reset value
Lighting	no reset
Language	no reset
SIL	no reset
HART mode	no reset

Factory setting
Like basic adjustment, furthermore special parameters are reset to default values.[2)]

Pointer
The min. and max. distance values are reset to the actual value.

Optional settings

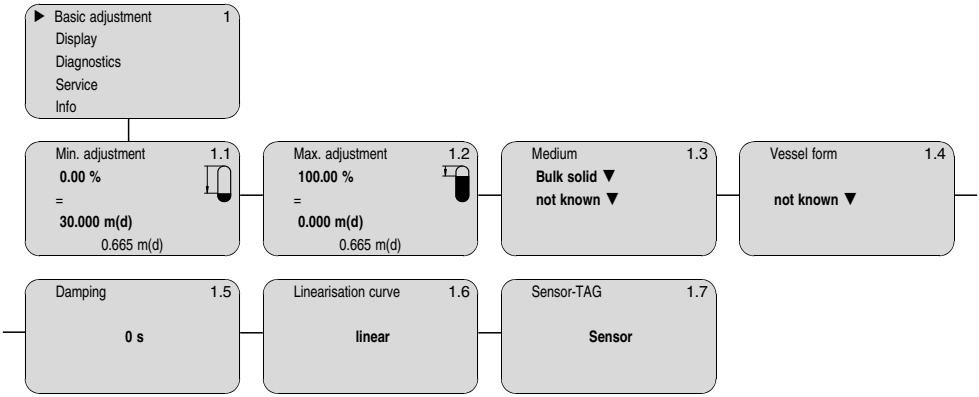
Additional adjustment and diagnosis options such as e.g. scaling, simulation or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual "*Indicating and adjustment module*".

[2)] Special parameters are parameters which are set customer-specifically on the service level with the adjustment software PACTware.

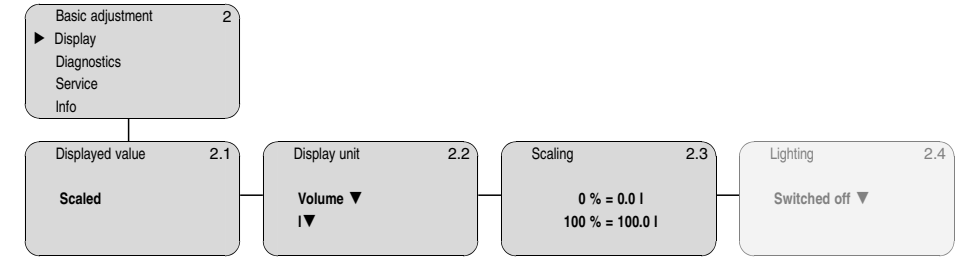
6.5 Menu schematic

Information:
Depending on the version and application, the light-coloured menu windows are not always available or offer nor selection possibility.

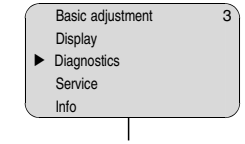
Basic adjustment

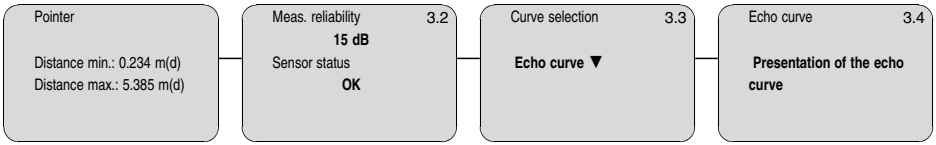


Display

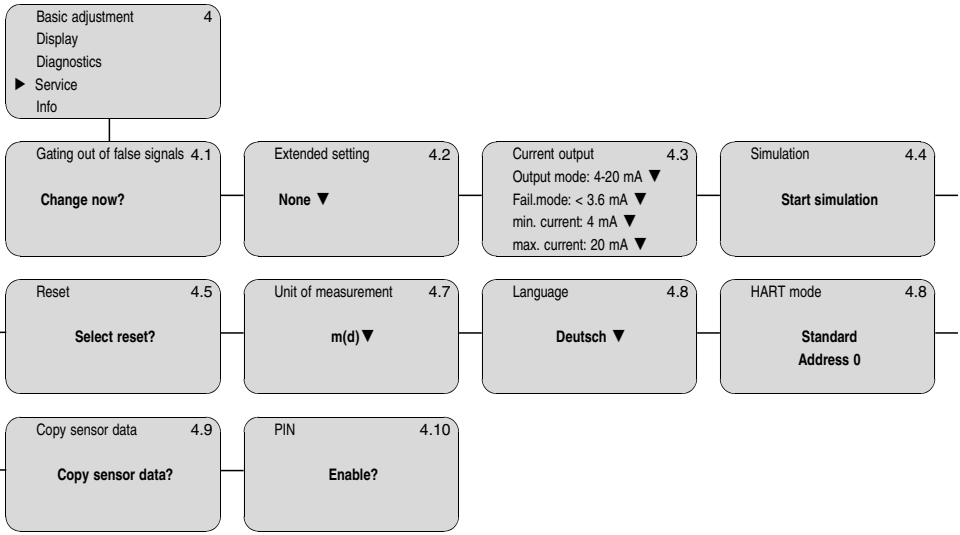


Diagnostics

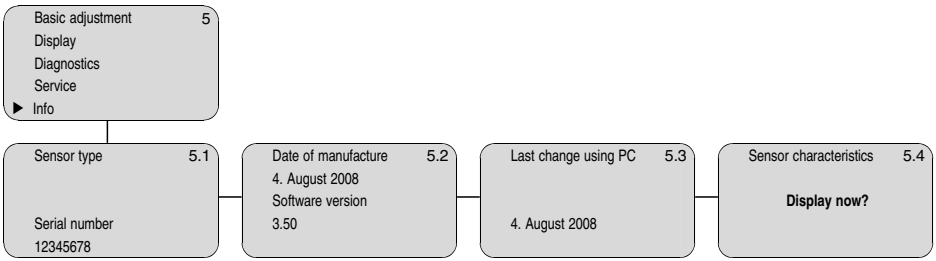




Service



Info



6.6 Saving the parameter adjustment data

It is recommended noting the adjusted data, e.g. in this operating instructions manual and archive them afterwards. They are hence available for multiple use or service purposes.

If VEGAPULS 68 is equipped with an indicating and adjustment module, the most important data can be read out of the sensor into indicating and adjustment module. The procedure is described in the operating instructions manual "*Indicating and adjustment module*" in the menu item "*Copy sensor data*". The data remain there permanently even if the sensor power supply fails.

If it is necessary to exchange the sensor, the indicating and adjustment module is inserted into the replacement instrument and the data are written into the sensor under the menu item "*Copy sensor data*".

7 Setup with PACTware and other adjustment programs

7.1 Connect the PC via VEGACONNECT

Internal connection via I²C interface

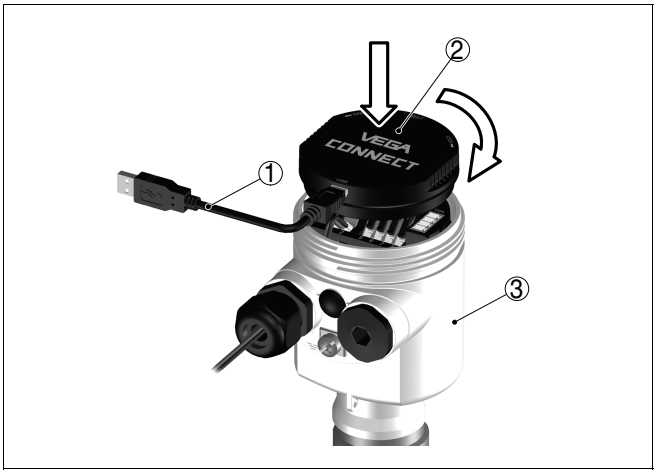


Fig. 25: Connection of the PC via VEGACONNECT directly to the sensor
1 USB cable to the PC
2 VEGACONNECT
3 Sensor

External connection via I²C interface

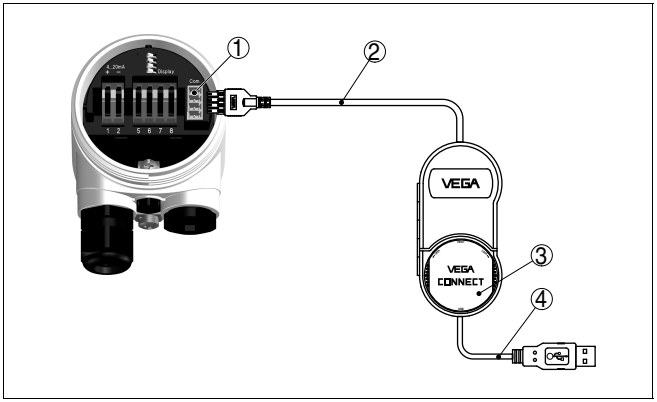


Fig. 26: Connection via I²C connection cable
1 I²C bus (com.) interface on the sensor
2 I²C connection cable of VEGACONNECT
3 VEGACONNECT
4 USB cable to the PC

Necessary components:

- VEGAPULS 68
- PC with PACTware and suitable VEGA DTM
- VEGACONNECT
- Power supply unit or processing system

Connection via HART

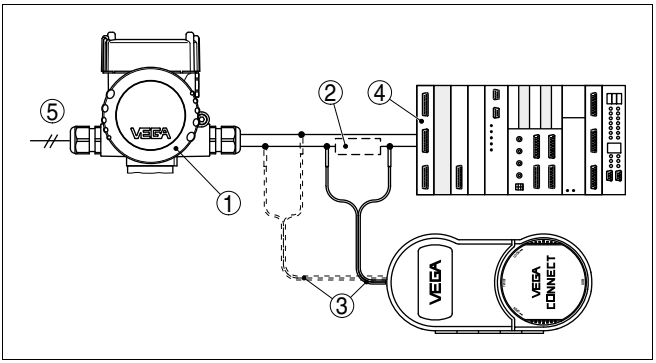


Fig. 27: Connecting the PC via HART to the signal cable
1 VEGAPULS 68
2 HART resistor 250 Ω (optional depending on processing)
3 Connection cable with 2 mm pins and terminals
4 Processing system/PLC/Voltage supply

Necessary components:

- VEGAPULS 68
- PC with PACTware and suitable VEGA DTM
- VEGACONNECT 4
- HART resistor approx. 250 Ω
- Power supply unit or processing system

Note:
With power supply units with integrated HART resistance (internal resistance approx. 250 Ω), an additional external resistance is not necessary. This applies, e. g. to the VEGA instruments VEGATRENN 149A, VEGADIS 371, VEGAMET 381). Also usual Ex separators are most of the time equipped with a sufficient current limitation resistor. In such cases, VEGACONNECT 4 can be connected parallel to the 4 … 20 mA cable.

7.2 Parameter adjustment with PACTware

Further setup steps are described in the operating instructions manual "*DTM Collection/PACTware*" attached to each CD and

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which can also be downloaded from our homepage. A detailed description is available in the online help of PACTware and the VEGA DTMs.

Note:
Keep in mind that for setup of VEGAPULS 68, DTM-Collection in the actual version must be used.

All currently available VEGA DTMs are provided in the DTM Collection on CD and can be obtained from the responsible VEGA agency for a token fee. This CD includes also the up-to-date PACTware version. The basic version of this DTM Collection incl. PACTware is also available as a free-of-charge download from the Internet.

Go via www.vega.com and "*Downloads*" to the item "*Software*".

7.3 Parameter adjustment with AMS™ and PDM

For VEGA sensors, instrument descriptions for the adjustment programs AMS™ and PDM are available as DD or EDD. The instrument descriptions are already implemented in the current versions of AMS™ and PDM. For older versions of AMS™ and PDM, a free-of-charge download is available via Internet.

Go via www.vega.com and "*Downloads*" to the item "*Software*".

7.4 Saving the parameter adjustment data

It is recommended to document or save the parameter adjustment data. They are hence available for multiple use or service purposes.

The VEGA DTM Collection and PACTware in the licensed, professional version provide suitable tools for systematic project documentation and storage.

8 Maintenance and fault rectification

8.1 Maintenance, cleaning

When used in the correct way, no special maintenance is required in normal operation.

In some applications, buildup on the antenna system can influence the measuring result. Depending on the sensor and application, make arrangements to avoid strong pollution of the antenna system. If necessary, clean the antenna system in certain intervals.

8.2 Remove interferences

Reaction when malfunctions occur

The operator of the system is responsible for taken suitable measures to remove interferences.

Causes of malfunction

A maximum of reliability is ensured. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measures to be taken are to check the output signals as well as to evaluate the error messages via the indicating and adjustment module. The procedure is described below. Further comprehensive diagnostics can be carried out on a PC with the software PACTware and the suitable DTM. In many cases, the causes can be determined in this way and faults can be rectified.

24 hour service hotline

However, should these measures not be successful, call the VEGA service hotline in urgent cases under the phone no. **+49 1805 858550**.

The hotline is available to you 7 days a week round-the-clock. Since we offer this service world-wide, the support is only available in the English language. The service is free of charge, only the standard telephone costs will be charged.

Checking the 4 … 20 mA signal

Connect a handheld multimeter in the suitable measuring range according to the wiring plan.

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? 4 … 20 mA signal not stable

- Level fluctuations

→ Set integration time via the indicating/adjustment module

? 4 … 20 mA signal missing

- Wrong connection

→ Check connection according to chapter "*Connection steps*" and if necessary, correct according to chapter "*Wiring plan*"

- No power supply

→ Check cables for breaks; repair if necessary

- supply voltage too low or load resistance too high

→ Check, adapt if necessary

? Current signal greater than 22 mA or less than 3.6 mA

- Electronics module defective

→ Exchange instrument or return instrument for repair

In Ex applications, the regulations for the wiring of intrinsically safe circuits must be observed.

Fault messages via the indicating/adjustment module

? E013

- no measured value available

→ sensor in boot phase

→ Sensor does not find an echo, e.g. due to faulty installation or wrong parameter adjustment

? E017

- Adjustment span too small

→ Carry out a fresh adjustment and increase the distance between min. and max. adjustment

? E036

- no operable sensor software

→ Carry out a software update or send the instrument for repair

? E041, E041, E042, E043

- Hardware error, electronics defective

→ Exchange instrument or return instrument for repair

Reaction after fault rectification

Depending on the failure reason and measures taken, the steps described in chapter "*Set up*" must be carried out again, if necessary.

8.3 Exchanging the electronics module

If the electronics module is defective, it can be replaced by the user.

In Ex applications only one instrument and one oscillator with respective Ex approval may be used.

If there is no electronics module available on site, one can be ordered from the VEGA agency serving you.

Sensor serial number

The order data of the sensor must be downloaded into the new electronics module. This can be done:

- At the factory by VEGA
- Or on site by the user

In both cases, the sensor serial number is necessary. The serial numbers are stated on the type label of the instrument, inside the housing or on the delivery note.

Information:
When loading on site, first of all the order data must be downloaded from the Internet (see operating instructions manual "*Oscillator*").

Assignment

The oscillators are adapted to the respective sensor and differ in their signal output or in their power supply. You can find a suitable oscillator in the following overview.

8.4 Instrument repair

If a repair is necessary, please proceed as follows:

You can download a return form (23 KB) from our Internet homepage www.vega.com under: "*Downloads - Forms and certificates - Repair form*".

By doing this you help us carry out the repair quickly and without having to call back for needed information.

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Please ask the agency serving you for the address of your return shipment. You can find the respective agency on our website www.vega.com under: "*Company - VEGA worldwide*"

9 Dismounting

9.1 Dismounting steps

Warning:
Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

9.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the electronics to be easily separable.

WEEE directive 2002/96/EG
This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects to persons and environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

If you have no possibility to dispose of the old instrument professionally, please contact us concerning return and disposal.

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10 Supplement

10.1 Technical data

General data

316L corresponds to 1.4404 or 1.4435

Materials, wetted parts	
– Process fitting	316L, Hastelloy C22, Hastelloy C22 plated
– Seal process fitting - threaded version	Klingersil C-4400
– Antenna	316L, 316L electropolished, Hastelloy C22
– Antenna cone	PTFE (TFM 1600 PTFE)
– seal, antenna system	FKM (Viton), FFKM Kalrez 2035, 6230 (FDA), 6375)
Materials, non-wetted parts	
– Housing	Aluminium die-casting powder coated
– Seal between housing and housing cover	Silicone
– Inspection window in housing cover for PLICSCOM	Polycarbonate (UL-746-C listed)
– Ground terminal	316Ti/316L
Weight with horn antenna	
– Process fitting - thread	2.5 … 3.2 kg (5.5 … 7.1 lbs), depending on thread size and housing
– Process fitting - flange	4.7 … 15.9 kg (10.4 … 35.1 lbs), depending on flange size and housing
– Process fitting - swivelling holder with flange	5.7 … 16.9 kg (12.6 … 37.3 lbs), depending on the flange size and housing
Weight with parabolic antenna	
– Process fitting - thread	3.3 … 4.1 kg (7.3 … 9.0 lbs), depending on thread size and housing
– Process fitting - flange	5.5 … 16.7 kg (12.1 … 36.8 lbs), depending on the flange size and housing
– Process fitting - swivelling holder with flange	6.5 … 17.7 kg (14.33 … 39 lbs), depending on flange size and housing

Output variable

Output signal	4 … 20 mA/HART
Signal resolution	1.6 µA

Failure signal current output (adjustable)	mA-value unchanged 20.5 mA, 22 mA, < 3.6 mA
Max. output current	22 mA
Load	< 500 Ω[3]
Integration time (63 % of the input variable)	0 … 999 s, adjustable
Fulfilled NAMUR recommendations	NE 43

Input variable

Measured value	distance between process fitting and product surface
Max. measuring range	70 m (229.7 ft)
Min. distance from antenna end	400 mm (15.75 in)

Reference conditions to measuring accuracy (similar to DIN EN 60770-1)

Reference conditions according to DIN EN 61298-1

– Temperature	+18 … +30 °C (+64 … +86 °F)
– Relative humidity	45 … 75 %
– Air pressure	860 … 1060 mbar/86 … 106 kPa (12.5 … 15.4 psig)

Other reference conditions

– Reflector	ideal reflector, e.g. metal plate 2 x 2 m
– False reflections	Biggest false echo, 20 dB smaller than the useful echo

Characteristics and performance data

Frequency	K-band
Interval	approx. 1 s
Beam angle 3 dB	10°
Step response or adjustment time[4]	> 1 s (dependent on the parameter setting)
Max. level change	Adjustable up to 1 m/min. (dependent on the parameter adjustment)

Max. emitted HF power of the antenna system

– Pulse peak power	< 10 mW
– Pulse duration	< 2 ns

[3] With inductive load ohmic share min. 25 Ω/mH.

[4] Time to output the correct level (with max. 10 % deviation) after a sudden level change.

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- Average power < 25 µW
- Average power with 1 m distance < 1 µW/cm²

Measuring accuracy

Resolution, general	max. 1 mm (0.039 in)
Deviation[5)]	see diagrams

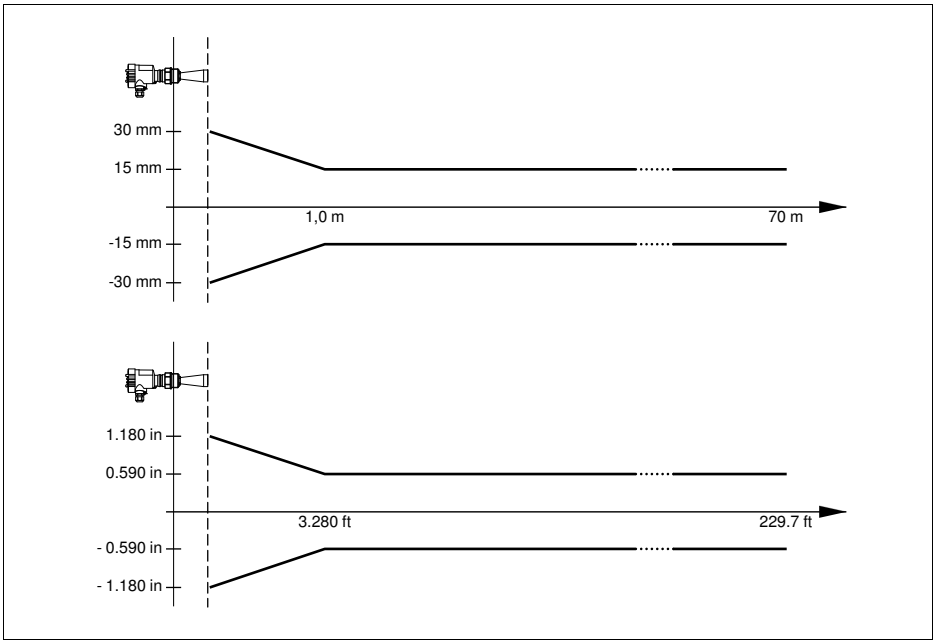

Fig. 28: Deviation VEGAPULS 68 with horn antenna

5) Incl. non-linearity, hysteresis and non-repeatability.

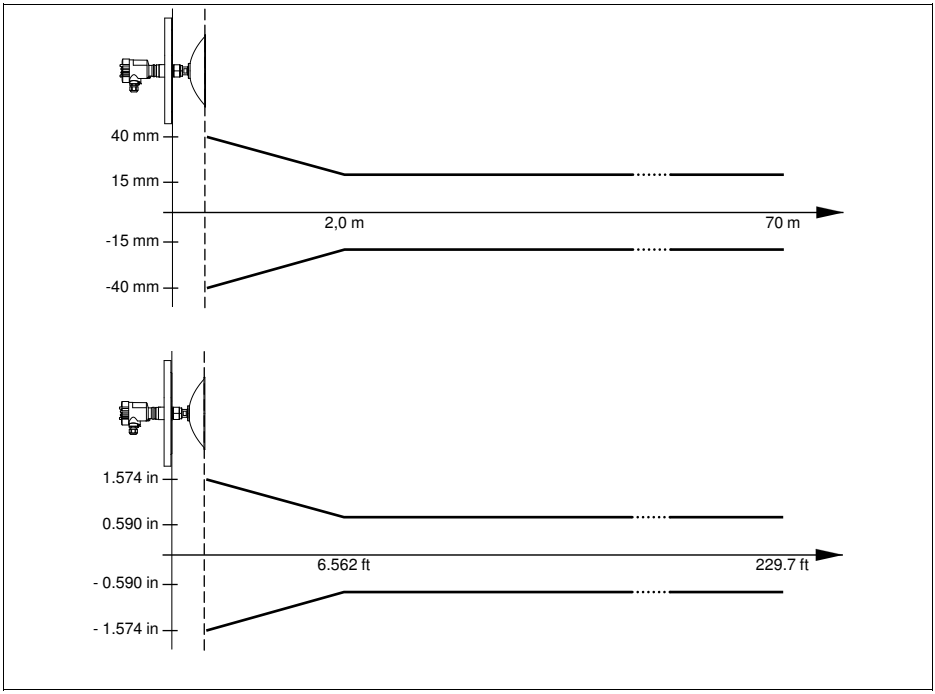

Fig. 29: Accuracy VEGAPULS 68 with parabolic antenna

Influence of the ambient temperature to the sensor electronics[6)]

Average temperature coefficient of the zero signal (temperature error)	0.03 %/10 K

Ambient conditions

Ambient, storage and transport temperature	-40 … +70 °C (-40 … +158 °F)

Process conditions

Process temperature (measured on the process fitting), depending on seal and antenna system

– FKM (Viton)	-40 … +130 °C (-40 … +266 °F)
– FFKM (Kalrez 2035, 6230 (FDA))	-15 … +130 °C (+5 … +266 °F)

6) Relating to the nominal measuring range.

– FFKM (Kalrez 2035, 6230) (FDA) with temperature adapter	-15 … +200 °C (+5 … +392 °F)
– FFKM (Kalrez 6375)	-20 … +130 °C (-4 … +266 °F)
– FFKM (Kalrez 6375) with temperature adapter	-20 … +200 °C (-4 … +392 °F)

For the vessel pressure, you also have to note the specifications on the type label. Always the lowest value is applicable.

Vessel pressure - horn antenna	
– without swivelling holder	-1 … 40 bar/-100 … 4000 kPa (-14.5 … 580 psi)
– with swivelling holder	-1 … 1 bar/-100 … 100 kPa (-14.5 … 14.5 psi) not sealing
Vessel pressure - parabolic antenna	
– without swivelling holder	-1 … 6 bar/-100 … 600 kPa (-14.5 … 87 psi)
– with swivelling holder	-1 … 1 bar/-100 … 100 kPa (-14.5 … 14.5 psi) not sealing
Vessel pressure relating to the flange nominal stage	see supplementary instructions manual "*Flanges according to DIN-EN-ASME-JIS*"
Vibration resistance	mechanical vibrations with 4 g and 5 … 100 Hz[7)]

Data on rinsing air connection

Pressure	< 6 bar (87.02 psi)
Air quantity see diagram	

[7)] Tested according to the regulations of German Lloyd, GL directive 2.

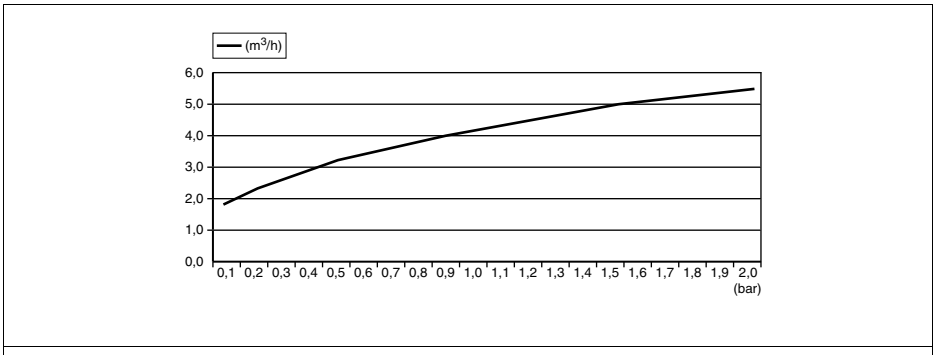

Fig. 30: Air quantity diagram

Thread	G⅛ A
Catch	
– with non-Ex	Dust protection cover of PE
– with Ex	Threaded plug of 316Ti

Reflux valve - unmounted (as option with non-Ex version, included in the scope of delivery with Ex version)

– Material	316Ti
– Seal	FKM (Viton), FFKM (Kalrez 6375)
– for tube diameter	6 mm
– opening pressure	0.5 bar (7.252 psi)
– Nominal pressure stage	PN 250

Electromechanical data - version IP 66/IP 67

Cable entry	
– Double chamber housing	• 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5; plug M12 x 1 for VEGADIS 61 (optional) or: • 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT, plug M12 x 1 for VEGADIS 61 (optional) or: • 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5; plug M12 x 1 for VEGADIS 61 (optional)
Spring-loaded terminals for wire cross-section	2.5 mm² (AWG 14)

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Indicating and adjustment module	
Voltage supply and data transmission	through the sensor
Indication	LC display in Dot matrix
Adjustment elements	4 keys
Protection	
– unassembled	IP 20
– mounted into the sensor without cover	IP 40
Materials	
– Housing	ABS
– Inspection window	Polyester foil

Voltage supply	
Supply voltage	
– Non-Ex and Ex-d instrument	20 … 72 V DC, 20 … 253 V AC, 50/60 Hz
Max. power consumption	4 VA; 2.1 W

Electrical protective measures	
Protection	IP 66/IP 67
Overvoltage category	III
Protection class	I

Approvals

Depending on the version, instruments with approvals can have different technical data.

For these instruments, the corresponding approval documents have to be taken into account. These are part of the delivery or can be downloaded via the serial number search under www.vega.com.

10.2 Dimensions

Housing

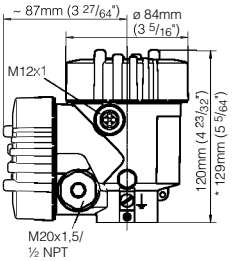
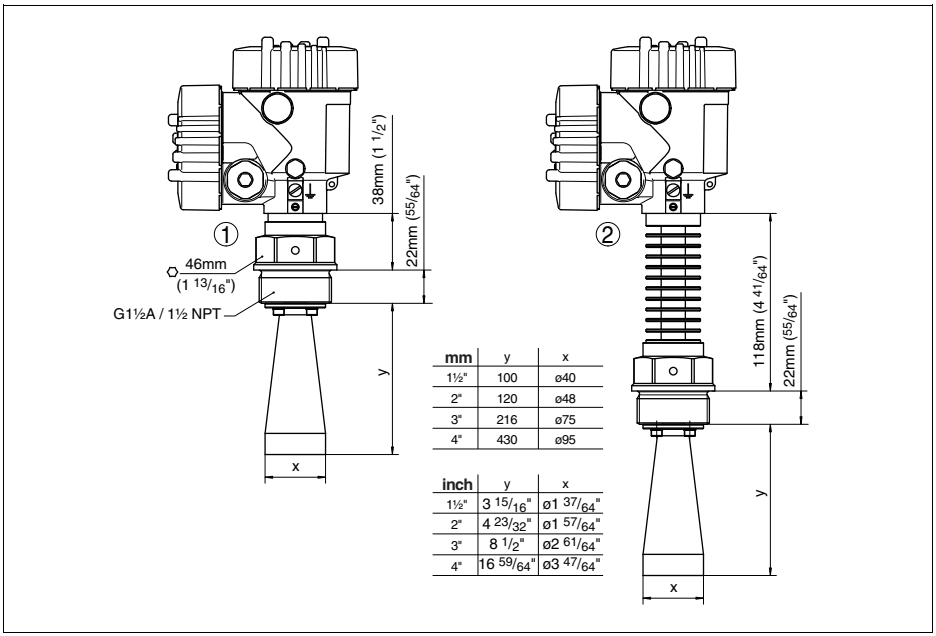


Fig. 31: Aluminium double chamber housing (with integrated indicating and adjustment module the housing is 9 mm/ 0.35 in higher)

VEGAPULS 68 - horn antenna in threaded version

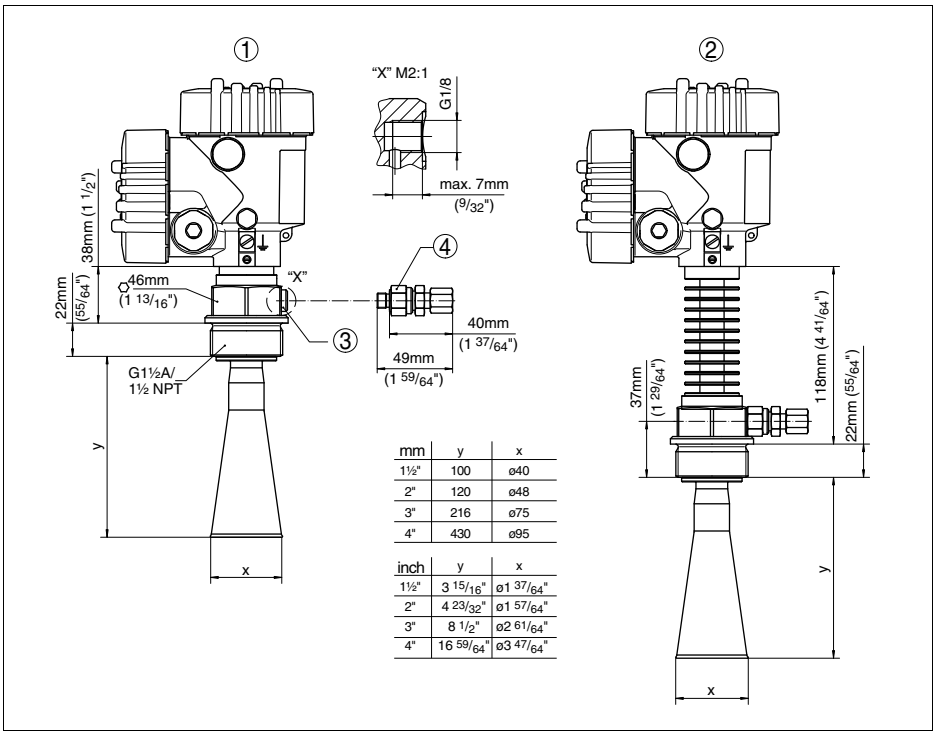


mm	y	x
1½"	100	ø40
2"	120	ø48
3"	216	ø75
4"	430	ø95

inch	y	x
1½"	3 15/16"	ø1 37/64"
2"	4 23/32"	ø1 57/64"
3"	8 1/2"	ø2 61/64"
4"	16 59/64"	ø3 47/64"

Fig. 32: VEGAPULS 68 - horn antenna in threaded version
1 Standard
2 with temperature adapter

VEGAPULS 68 - horn antenna in threaded version with purging air connection

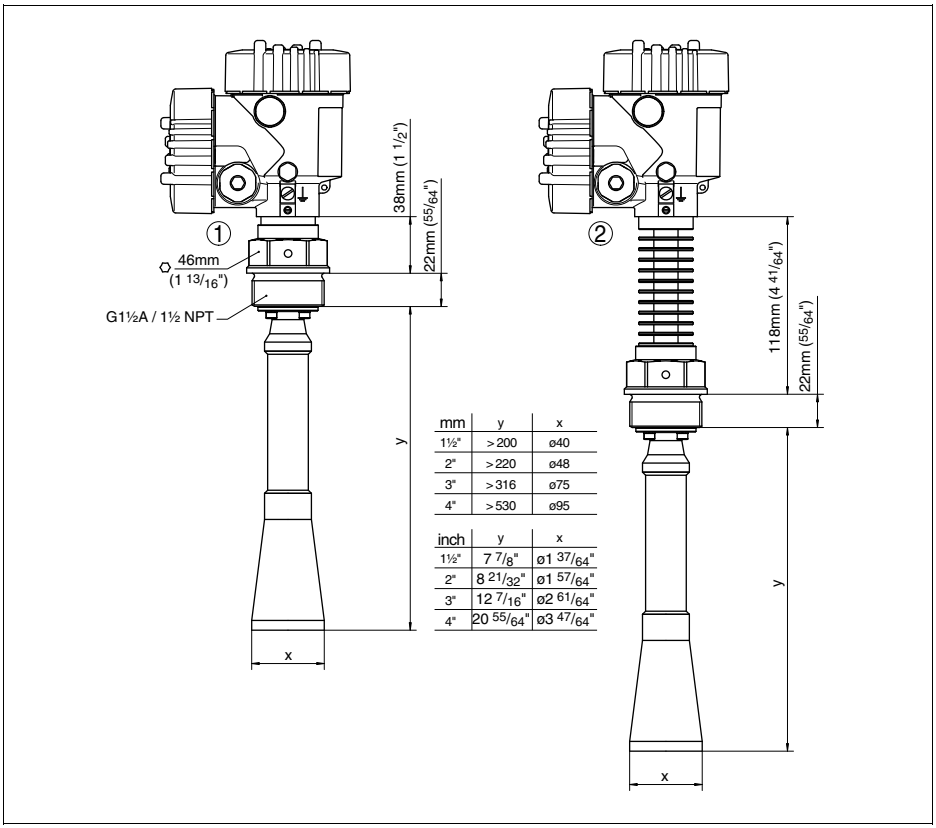


mm	y	x
1½"	100	ø40
2"	120	ø48
3"	216	ø75
4"	430	ø95

inch	y	x
1½"	3 15/16"	ø1 37/64"
2"	4 23/32"	ø1 57/64"
3"	8 1/2"	ø2 61/64"
4"	16 59/64"	ø3 47/64"

Fig. 33: VEGAPULS 68 - horn antenna in threaded version with purging air connection and reflux valve (option)
1 Standard
2 with temperature adapter
3 Purging air connection G⅛ A for mounting of a suitable adapter
4 Reflux valve - attached (with non-Ex optionally available, with Ex in the scope of delivery), for tube diameters 6 mm

VEGAPULS 68 - horn antenna in threaded version with antenna extension



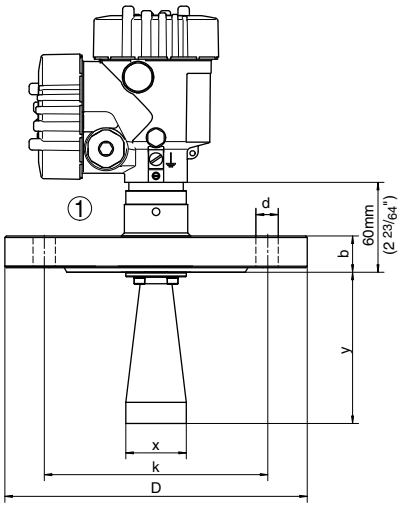
mm	y	x
1½"	> 200	ø40
2"	> 220	ø48
3"	> 316	ø75
4"	> 530	ø95

inch	y	x
1½"	7 7/8"	ø1 37/64"
2"	8 21/32"	ø1 57/64"
3"	12 7/16"	ø2 61/64"
4"	20 55/64"	ø3 47/64"

Fig. 34: VEGAPULS 68 - horn antenna in threaded version with rinsing air connection, antenna extension and reflux valve (option)[8)]
1 Standard
2 with temperature adapter

[8)] An antenna extension causes a reduction of sensitivity at close range in dependence on product properties. A suitable support for the antenna extension must be provided as required by its length.

VEGAPULS 68 - horn antenna in flange version

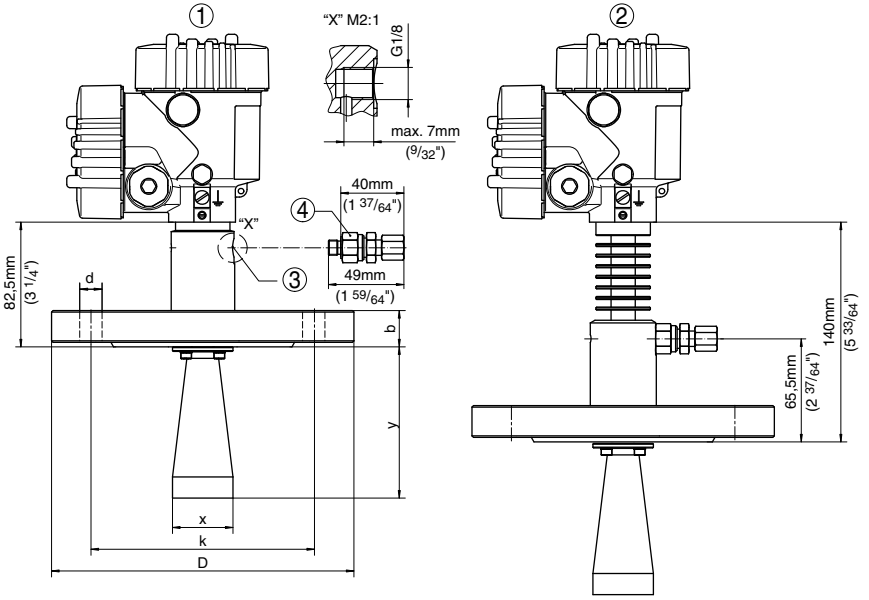


mm	D	b	k	d	x	y
DN 40 PN 40	150	18	110	4xø18	40	100
DN 50 PN 40	165	20	125	4xø18	48	120
DN 80 PN 40	200	24	160	8xø18	75	216
DN 100 PN 16	220	20	180	8xø18	95	430
DN 150 PN 16	285	22	240	8xø22	95	430
2" 150 lb	152,4	19,1	120,7	4xø19,1	48	120
3" 150 lb	190,5	23,9	152,4	4xø19,1	75	216
4" 150 lb	228,6	23,9	190,5	8xø19,1	95	430
6" 150 lb	279,4	25,4	241,3	8xø22,4	95	430

inch	D	b	k	d	x	y
DN 40 PN 40	5 29/32"	45/64"	4 21/64"	4xø45/64"	1 37/64"	3 15/16"
DN 50 PN 40	6 1/2"	25/32"	4 59/64"	4xø45/64"	1 57/64"	4 23/32"
DN 80 PN 40	7 7/8"	15/16"	6 19/64"	8xø45/64"	2 61/64"	8 1/2"
DN 100 PN 16	8 21/32"	25/32"	7 3/32"	8xø45/64"	3 47/64"	16 59/64"
DN 150 PN 16	11 7/32"	55/64"	9 29/64"	8xø55/64"	3 47/64"	16 59/64"
2" 150 lb	6"	3/4"	4 3/4"	4xø3/4"	1 57/64"	4 23/32"
3" 150 lb	7 1/2"	15/16"	6"	4xø3/4"	2 61/64"	8 1/2"
4" 150 lb	9"	15/16"	7 1/2"	8xø3/4"	3 47/64"	16 59/64"
6" 150 lb	11"	1"	9 1/2"	8xø7/8"	3 47/64"	16 59/64"

Fig. 35: VEGAPULS 68 - horn antenna in flange version
1 Standard
2 with temperature adapter

VEGAPULS 68 - horn antenna in flange version with purging air connection

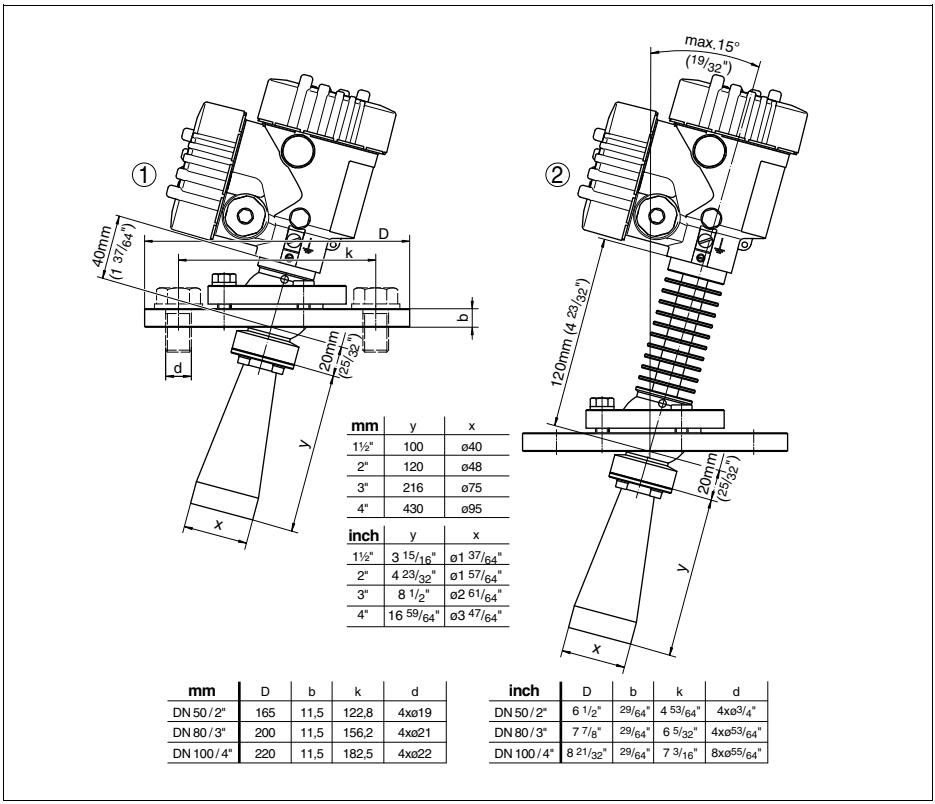


mm	D	b	k	d	x	y
DN 40 PN 40	150	18	110	4xø18	40	100
DN 50 PN 40	165	20	125	4xø18	48	120
DN 80 PN 40	200	24	160	8xø18	75	216
DN 100 PN 16	220	20	180	8xø18	95	430
DN 150 PN 16	285	22	240	8xø22	95	430
2" 150 lb	152,4	19,1	120,7	4xø19,1	48	120
3" 150 lb	190,5	23,9	152,4	4xø19,1	75	216
4" 150 lb	228,6	23,9	190,5	8xø19,1	95	430
6" 150 lb	279,4	25,4	241,3	8xø22,4	95	430

inch	D	b	k	d	x	y
DN 40PN 40	5 29/32"	45/64"	4 21/64"	4xø45/64"	1 37/64"	3 15/16"
DN 50 PN 40	6 1/2"	25/32"	4 59/64"	4xø45/64"	1 57/64"	4 23/32"
DN 80 PN 40	7 7/8"	15/16"	6 19/64"	8xø45/64"	2 61/64"	8 1/2"
DN 100 PN 16	8 21/32"	25/32"	7 3/32"	8xø45/64"	3 47/64"	16 59/64"
DN 150 PN 16	11 7/32"	55/64"	9 29/64"	8xø55/64"	3 47/64"	16 59/64"
2" 150 lb	6"	3/4"	4 3/4"	4xø3/4"	1 57/64"	4 23/32"
3" 150 lb	7 1/2"	15/16"	6"	4xø3/4"	2 61/64"	8 1/2"
4" 150 lb	9"	15/16"	7 1/2"	8xø3/4"	3 47/64"	16 59/64"
6" 150 lb	11"	1"	9 1/2"	8xø7/8"	3 47/64"	16 59/64"

Fig. 36: VEGAPULS 68 - horn antenna in flange version with purging air connection
1 Standard
2 with temperature adapter
3 Purging air connection G⅛ A for mounting of a suitable adapter
4 Reflux valve - attached (with non-Ex optionally available, with Ex in the scope of delivery), for tube diameters 6 mm

VEGAPULS 68 - horn antenna and swivelling holder



mm	y	x
1½"	100	ø40
2"	120	ø48
3"	216	ø75
4"	430	ø95

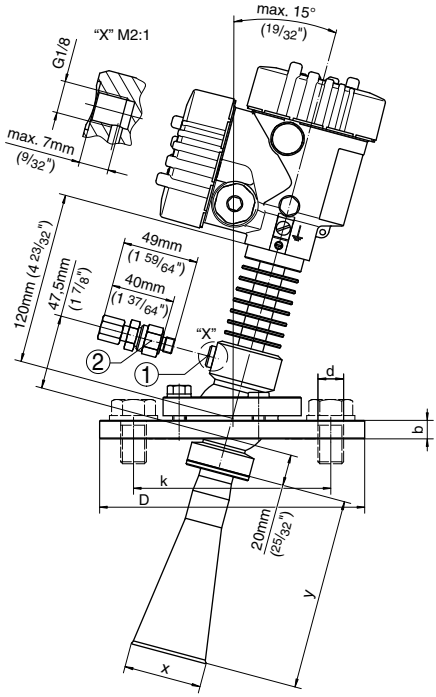
inch	y	x
1½"	3 15/16"	ø1 37/64"
2"	4 23/32"	ø1 57/64"
3"	8 1/2"	ø2 61/64"
4"	16 59/64"	ø3 47/64"

mm	D	b	k	d
DN 50 / 2"	165	11,5	122,8	4xø19
DN 80 / 3"	200	11,5	156,2	4xø21
DN 100 / 4"	220	11,5	182,5	4xø22

inch	D	b	k	d
DN 50 / 2"	6 1/2"	29/64"	4 53/64"	4xø3/4"
DN 80 / 3"	7 7/8"	29/64"	6 5/32"	4xø53/64"
DN 100 / 4"	8 21/32"	29/64"	7 3/16"	8xø55/64"

Fig. 37: VEGAPULS 68 - horn antenna and swivelling holder
1 Standard
2 with temperature adapter

VEGAPULS 68 - horn antenna, swivelling holder and purging air connection



mm	y	x
1½"	100	ø40
2"	120	ø48
3"	216	ø75
4"	430	ø95

inch	y	x
1½"	3 15/16"	ø1 37/64"
2"	4 23/34"	ø1 57/64"
3"	8 1/2"	ø2 61/64"
4"	16 59/64"	ø3 47/64"

mm	D	b	k	d
DN 50 / 2"	165	11,5	122,8	4xø19
DN 80 / 3"	200	11,5	156,2	4xø21
DN 100 / 4"	220	11,5	182,5	4xø22

inch	D	b	k	d
DN 50 / 2"	6 1/2"	29/64"	4 53/64"	4xø3/4"
DN 80 / 3"	7 7/8"	29/64"	6 5/32"	4xø53/64"
DN 100 / 4"	8 21/32"	29/64"	7 3/16"	8xø55/64"

Fig. 38: VEGAPULS 68 - horn antenna, swivelling holder and rinsing air connection and reflux valve
1 Standard
2 with temperature adapter
3 Purging air connection G⅛ A for mounting of a suitable adapter
4 Reflux valve - attached (with non-Ex optionally available, with Ex in the scope of delivery), for tube diameters 6 mm

VEGAPULS 68 - parabolic antenna in threaded version

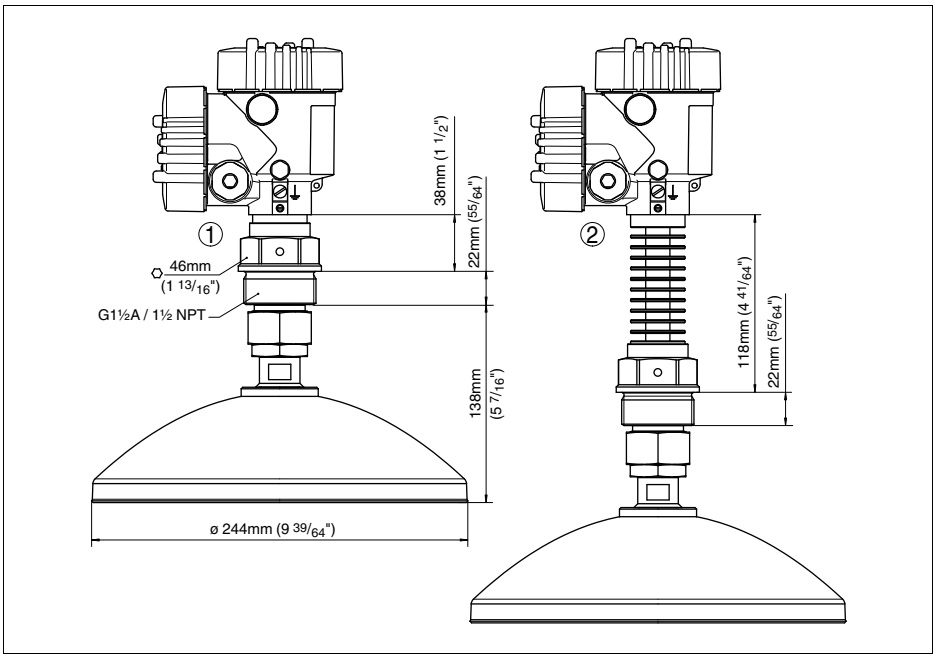
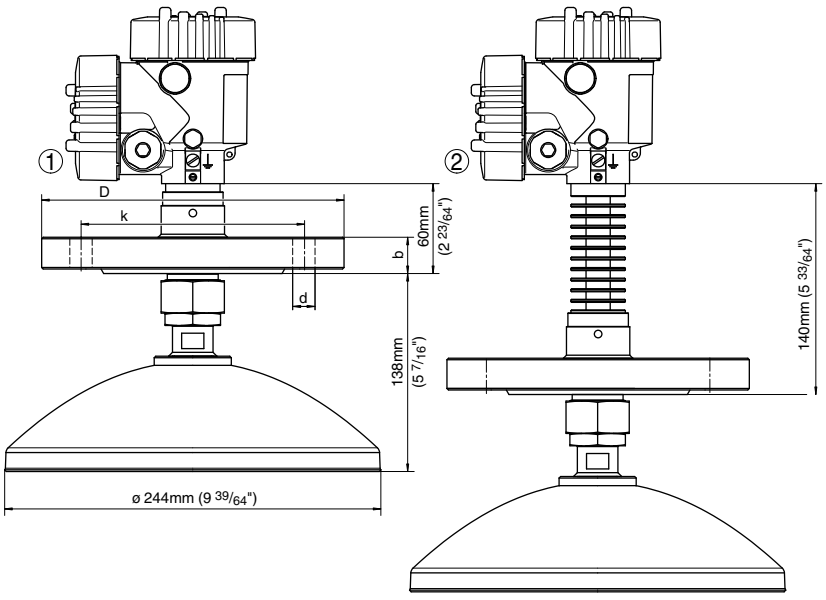


Fig. 39: VEGAPULS 68 - parabolic antenna in threaded version
1 Standard
2 with temperature adapter

VEGAPULS 68 - parabolic antenna in flange version

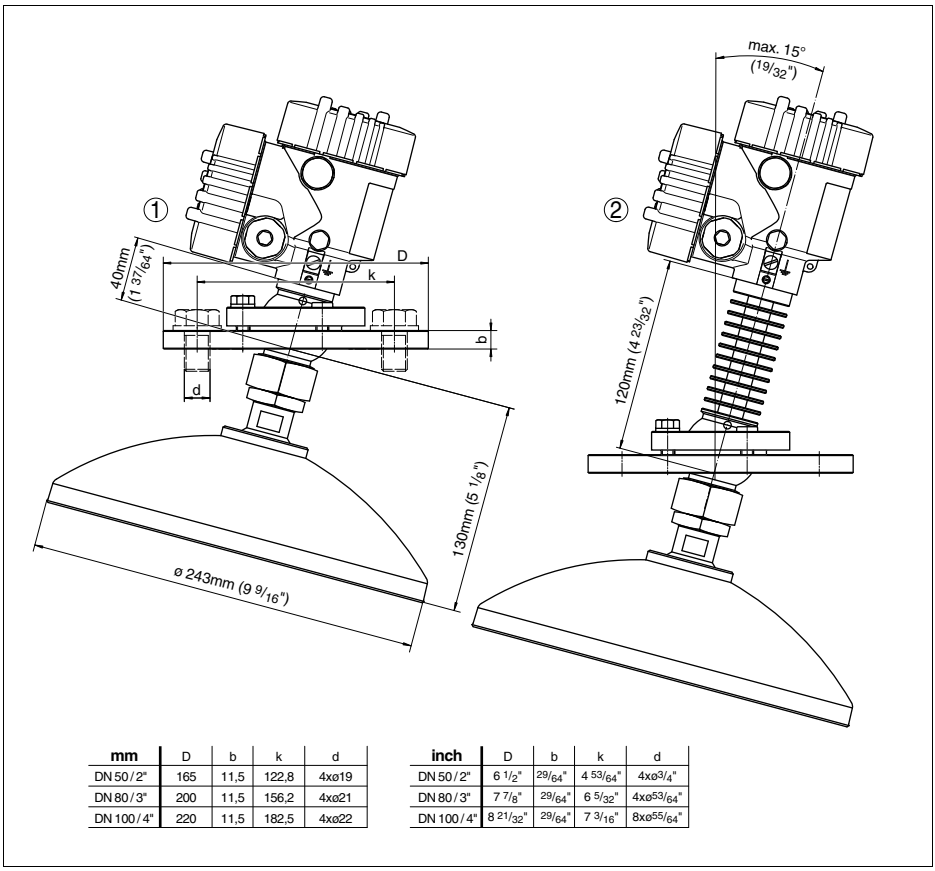


mm	D	b	k	d
DN 40 PN 40	150	18	110	4xø18
DN 50 PN 40	165	20	125	4xø18
DN 80 PN 40	200	24	160	8xø18
DN 100 PN 16	220	20	180	8xø18
DN 150 PN 16	285	22	240	8xø22
2" 150 lb	152,4	19,1	120,7	4xø19,1
3" 150 lb	190,5	23,9	152,4	4xø19,1
4" 150 lb	228,6	23,9	190,5	8xø19,1
6" 150 lb	279,4	25,4	241,3	8xø22,4

inch	D	b	k	d
DN 40PN 40	5 29/32"	45/64"	4 21/64"	4xø45/64"
DN 50 PN 40	6 1/2"	25/32"	4 59/64"	4xø45/64"
DN 80 PN 40	7 7/8"	15/16"	6 19/64"	8xø45/64"
DN 100 PN 16	8 21/32"	25/32"	7 3/32"	8xø45/64"
DN 150 PN 16	11 7/32"	55/64"	9 29/64"	8xø55/64"
2" 150 lb	6"	3/4"	4 3/4"	4xø3/4"
3" 150 lb	7 1/2"	15/16"	6"	4xø3/4"
4" 150 lb	9"	15/16"	7 1/2"	8xø3/4"
6" 150 lb	11"	1"	9 1/2"	8xø7/8"

Fig. 40: VEGAPULS 68 - parabolic antenna in flange version
1 Standard
2 with temperature adapter

VEGAPULS 68 - parabolic antenna and swivelling holder

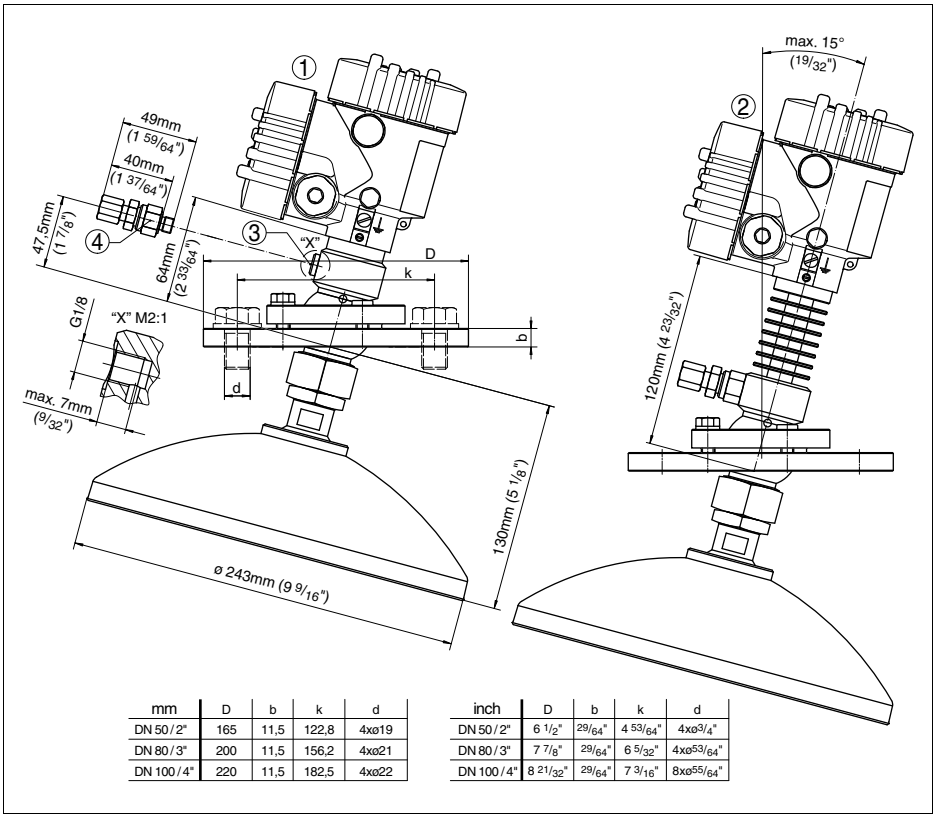


mm	D	b	k	d
DN 50 / 2"	165	11,5	122,8	4xø19
DN 80 / 3"	200	11,5	156,2	4xø21
DN 100 / 4"	220	11,5	182,5	4xø22

inch	D	b	k	d
DN 50 / 2"	6 1/2"	29/64"	4 53/64"	4xø3/4"
DN 80 / 3"	7 7/8"	29/64"	6 5/32"	4xø53/64"
DN 100 / 4"	8 21/32"	29/64"	7 3/16"	8xø55/64"

Fig. 41: VEGAPULS 68 - parabolic antenna and swivelling holder
1 Standard
2 with temperature adapter

VEGAPULS 68 - parabolic antenna and swivelling holder with purging air connection



mm	D	b	k	d
DN 50 / 2"	165	11,5	122,8	4xø19
DN 80 / 3"	200	11,5	156,2	4xø21
DN 100 / 4"	220	11,5	182,5	4xø22

inch	D	b	k	d
DN 50 / 2"	6 1/2"	29/64"	4 53/64"	4xø3/4"
DN 80 / 3"	7 7/8"	29/64"	6 5/32"	4xø53/64"
DN 100 / 4"	8 21/32"	29/64"	7 3/16"	8xø55/64"

Fig. 42: VEGAPULS 68 - parabolic antenna and swivelling holder
1 Standard
2 with temperature adapter
3 Purging air connection G⅛ A for mounting of a suitable adapter
4 Reflux valve - attached (with non-Ex optionally available, with Ex in the scope of delivery), for tube diameters 6 mm

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All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.

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